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THE KANSAS CITY REVIEW,

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VOL. IX. NOVEMBER, 1885. NO. 4.

A CHINESE COLUMBUS.

II.

In northern Mexico is a ruin which has been named *Casa Grande* by the Spaniards. It is, or rather was, a large structure (probably communal and related to the Zuni houses still existing in the south-west), built of adobe blocks and of considerable antiquity—at least the natives knew nothing of its origin at the time of the conquest. According to the latest and most reliable investigators the adobe blocks of which this structure is composed were not dried before being placed in the wall but were moulded *in situ* by the use of plank boxing. This is not the modern mode of building with adobe bricks; neither was it the Mesopotamian or Egyptian method. But it seems to have been the custom in Fusang to build houses in this manner. It must be confessed that this coincidence is rather singular as the Mexicans of Cortez' day built their adobe walls in the modern way and seem to have forgotten the art as practiced by the builders of the *Casa Grande.* *

It is true, also, that no walled cities existed in America (with the possible exception of Tuloom in Yucatan) prior to the discovery; but the inhabitants were not ignorant of fortification, as witness the defense of Tenochtitlan and the barrier of Tlascala (as well as numerous other examples), and they were not unskilled in the art of war. Indeed the Aztecs were far from being a peaceful

* In an article by Chas. H. Lepper in the Popular Science Monthly for November, entitled "Home life of the Thibetans," it is said that builders of houses in that Rome of Buddhism "much prefer to have only the foundations of stone and the walls above ground of well-prepared clay, which latter they build up between plank moulds. These are removed as each layer is finished, and then raised to act as moulds for the next layer."

people when the Spaniards came. But it may be urged that traditions were current in Mexico, and repeatedly rehearsed to the inquisitive *Conquistadores*, of the existence of an ancient nation, the Toltecs, who were the forerunners of the Aztecs in Anahuac and whose peaceful character and ignorance of military affairs had made them an easy prey to the savage valor of the later comers. Legend avers that when the Chichimces and Aztecs entered Anahuac they found it a land of happiness and peace, culture and piety, and that it was their sanguinary example which soon filled it with bloodshed and cruelty and obscene sacrificial rites.

As Fusang was named from the plant which gave its people so many of the necessities of life, so was it with Mexico. The ancient Aztec name for the Maguey was *Metl* and as compounds and derivatives in Aztec drop the *tl*, the word became *me; xiuitl* (*x* pronounced as *sh*) is the Aztec word for herb or plant, and, losing the *tl*, would become *xiui*, and later *xi; co* represents the same meaning as our word *in* with a locative signification—hence Mexico, the "Place of the Century Plant." This term was given to the land as a whole while the city was called *Tenochtitlan*, "The Prickly Pear upon a Stone."

The Mexicans certainly had "literary characters" which they used freely and intelligently and the material used for writing upon was for the most part the paper made from the Maguey fibre. The literature, large in quantity if the chroniclers can be believed, of the Aztecs perished in the flames which destroyed their idols, temples and palaces, and the few remnants that escaped are scattered throughout the civilized world.

The people of Fusang did not use iron, but made great use of copper in its place; it was precisely the same in Mexico. The two peoples were also alike in not making use of gold and silver as money. These precious metals were abundant, but were used only for ornamentation and in the arts. Cacaa beans, and other articles of merchandise, served as mediums of exchange in the Aztec markets.

The marriage customs of Fusang, as described by Hwui Shan, are not dissimilar to these customs as practiced among other primitive peoples. It is quite possible the Mexican of the Fifth Century thus wooed and won his bride, though no trace remains of the custom among the modern natives. The funeral customs of the two countries were, however, quite similar in many respects. The enforcement of criminal laws, and the character of the laws themselves, in Fusang, are remarkably like the jurisprudence of the Aztecs. In both, criminals of rank were tried by a council and buried in an excavation amidst ashes, and in both there was a distinction between the prisons north and south in respect to the character of the culprits confined in them. A resemblance is also apparent in the ascription given to the ruler. In Fu-

sang he his called "The Chief of Multitudes," and in Mexico "Chief of Men" and "Lord of the People."

This cursory presentation of Mr. Vining's argument must suffice: but it must not be supposed that it represents in any satisfactory degree the laborious, learned and really admirable presentation he makes of the subject. It has not been possible to show how completely he demolishes the criticisms of Klaproth, Neumann, Adam and others; how triumphantly he sustains de Guignes, d'Eichthal and their followers, by giving respectable proofs for what they could only show "in a glass darkly." It has not been shown with what industry he has ransacked the literary treasures of the world for proofs and illustrations, for critical capital and pertinent facts.

There remains, however, to outline the argument of Mr. Vining in support of the allegation that Buddhism found its way into America through the ministrations of the indefatigable missionaries of that noble and sacred faith. The spread of Gautama's tenets over the eastern world surpassed in rapidity of movement and number of converts every other religious faith; the more noteworthy from the fact that it was not propagated, like Christianity and Mahometanism, by the civil and military powers of governments. It was a gospel which lifted the lowest up to the highest, which robbed death of his sting and which taught a morality that needed neither reward or punishment for a spur. Actuated by the purest altruism, its monks carried from land to land, across deserts, and mountains and seas, in the midst of perils of all kinds, the gospel of the Lord Buddha to a fear-cursed world. To the north they penetrated into Siberia, to the east and south they sought the islands of the sea and westward they pushed as far as Greece and, perhaps, Scandinavia. Everywhere they carried the peculiar ceremonies and rituals which had grown up around the simple faith propagated by Guatami and wherever the faith was planted it took such strong root that no successive religious crusade has ever pushed it back one step.

It will be remembered by all who have read the pages of Prescott or Robertson, that there are traditions of the advent of several culture heroes in America. One of these, Quetzalcohuatl, the pure, the benevolent, the merciful, accompanied by a band of followers, appeared in Mexico ages ago and taught the natives their arts and sciences, and the doctrines of an elevated faith. He overthrew the altars and idols of the profane and superstitious, and instead of hecatombs, offered to heaven garlands of sweet flowers and the choicest gift of the harvest. He formed monastries, or religious houses for both sexes, which were still in existence, it was said, till Cortez swept them away, to make follow ground for his priests. The inhabitants of these houses lived very aus-

tere and ascetic lives. continence and penance were imposed upon them, and the chief business of their lives was to contemplate and worship the good, the beneficient Quetzalcohuatl. They were poorly clothed, wore their hair long, lived upon coarse and scanty fare and performed all sorts of work. At midnight they arose and bathed, then drew blood from their bodies and watched with chants and prayers till the early morning. For some devotees, even this austerity was not sufficient; such betook themselves to the woods and mountains to find the holy solitude they sought. The nuns were similar in many respects to the vestals of all other nations, as well as of the Buddists. The young monks, as described by Purchas, wore "their crowns shaven, as the friars in these parts." They "went into the citie foure or sixe together, to ask alms in all quarters, and, if they gote none, it was lawful for them to go into the cornefields." Of the several religious orders devoted to Quetzalcohuatl, the most renowned for sanctity, was Hamacazcayotl. The superior of this order lived in constant seclusion, no one being permitted to confer with him except the monarch. The lives of its members were very austere and laborious, and they were dressed in plain black robes.

Some of the priests were married, but the most of them followed the example of celibacy, set by Quetzalcohuatl. The members of all of these religious orders passed their time, when not occupied with penances and austerities, in writing the annals of the country, composing sermons and homilies, and educating the young. The parallelisms between the characteristics of Mexican priests and the bonzes of the Buddhist faith, hardly require pointing out. The devotees of Buddha of both sexes, spend their lives in vigils and penances. Their duties, education, and character are the same in all essential respects as those of Mexico.

"A belief in transmigration, firmly rooted and propagated in oriental countries, also existed in Mexico. In both regions it was the custom to adorn the temples with hangings of paper and in both a belief in enchantments and magic played a great role,"

It is in the sculptures of Palengne, however, that Buddhism seems to have left its most characteristic traces. The figure of Buddha is always represented as seated cross-legged on a couch, which is sometimes supported by two lions. Anyone who will take the trouble to examine Bancroft's "Native Races" or Short's volume, will find a very startling parallelism with Buddhist images in the cuts of Central American sculptures there presented. The oriental attitude, the similarity in the adjuncts and drapery, the incongruity of such figures with western art development, induce one to lend a ready credence to any theory which accounts for their existence without requiring a belief that they were the spontaneous creations of the American Indian.

It is by such arguments as these together with others of more or less pertinence, that Mr. Vining is led to believe that Hwui Shan and the five bhik'shus were Quetzalcohuatl and his followers; that they introduced the civilization of China and India, and taught the "Way" of Gautami; and that therefore the culture of the Mexicans and Central Americans was not indigenous, but the faint impression left, after centuries of vicissitudes, by the visit of Hwui Shan to America.

Now there is nothing incredible in the supposition that Asiatics visited the western continent in prehistoric times, or even that they found their way home again over the wide expanse of the Pacific. Such things might happen, like other accidents. But the difficulty in Mr. Vinings' case is, he proves too much. Not content with showing the probability of such a voyage (which is all that could be expected), he goes on to show by tradition, myth, religion and linguistics, as well as the tendency of art-forms, that the person named, at the time designated, did actually appear in Mexico, and exercise an immense influence in developing the latter progress.

The event thus sought to be dragged from oblivion happened 1,500 years ago, 1,000 years prior to the coming of Cortez. In that time what a shifting and changing has gone on in civilized Europe! The great Byzantine Empire has fallen and of its people not a soul can be distinguished among the races that now inhabit Turkey and Asia Minor. In Spain, France, Germany, Russia, Great Britain, new nations have arisen from squalid tribes and advanced to a stage of culture and influence beyond the conception of even Roman statesmanship. If such things could occur in countries that inherited all that Catholicism left of ancient moral and intellectual greatness, is it possible that the visit of a Buddhist bonze to the shores of America would work so great an influence on a few savage tribes as to be remembered for a thousand years? A century usually destroys the homogeneity of savage tribes. Wars, pestilence, migrations, famine all conspire to make combinations of savages ephemeral in their nature. Not less improbable is the survival of customs, religious or social, for such a length of time.

But there are other and stronger objections to Mr. Vining's theory. If a company of Budhist monks came to America as stated why did they not teach the aborigines the art of phonetic writing—the art so well known and so constantly practiced in India by all bonzes. Writing when once learned cannot be easily eradicated. A nation in possession of a system of writing like the Thibetan, or even the Malayan, must be utterly destroyed to destroy its knowledge of writing. Yet in America we find no graphic art that could not, and did not, take rise from the rudest pictography. There is not

a trace of an infusion of knowledge in this direction. Why, also, with an Asiatic culture, should the Americans have remained ignorant of the use of iron, of wheeled vehicles, of the horse, or some other beast of burden, of money and so many of the necessities and conveniences of life known to the Asiatics. Monks from Afghanistan should have known the pastoral arts and must have taught them to the Americans. If any of these arts had been carried to America by Buddhist bonzes their traces have been totally effaced, and a belief that customs, laws, religion, even language and race can survive the loss of these arts, when once acquired, is absurd.

The coincidences, remarkable as they may seem, can be explained on a principle now grown to be very familiar to investigators. The tendencies of widely different people are to advance on similar lines to reach definite ends. Samples of pottery dug up at Mycenae, at Troja, at Cyprus, in Greece, Egypt, Mesopotamia, India, Mexico, Peru, even from the mounds of the Mississippi Valley, cannot be distinguished from each other by the most expert scrutiny; and it is the same in the progress of customs and usages. In fact arguments drawn from such instances weigh very little now in determining race affinities; so that a mountain of such proofs would be of little effect in sustaining a theory which rests on nothing else.

Mr. Vining has undoubtedly said the utmost that can be advanced in support of his view. That his argument is not decesive of the question need hardly be stated. He has given, however, to literature one of those books whose genuine value lies in the mass of facts it presents, in a convenient, well digested shape. His book is well worth a perusal by the most sceptical, and, no doubt, many readers would dissent from the conclusions herein set forth.

HERBERT SPENCER'S ESSAY ON RELIGION.

II.

If the agnostics can harmonize their theory of evolution with the fact that theism was absolutely true and perfect in the very genesis of it, let them do so; but let them remember that the task devolved upon them is not to construct plausible theories concerning subsequent human degradations and anthropomorphisms of the primitive faith, but is to reconcile any *theory of evolution whatever, with the fact that primitive faith was a purer theism than any existing religion teaches*, and therefore, must have been a Divine Revelation.

While it is true that this faith was

the common property of all primitive races, it is also true that the Israelites alone preserved both the faith and the written statement of its origin, showing precisely what it was, and the process of the only development of it; and inasmuch as a great philosopher writes concerning 'the supernatural' as if he might be profoundly ignorant of the whole matter, it may be well to reproduce the facts presented by the original record, to demonstrate that these ideas of the supernatural did not "evolve out of ideas concerning the natural" but was revealed by God.

Some thirty-five centuries before the agnostics became so erudite and reputable as they now appear to be, Moses, the Monotheist, writing to and for his people who were all Unitarians, designated the one God in whom he and they beleived, by the name *Elohim*, which is the dual number of a Hebrew noun, and means two or a double God. He also represents the one God as applying to himself the pronouns *us* and *our*. "Let us make man in our image and our likeness." He also says that the two Gods, or the one dual God (*Elohim*) "created man in his own image; in the image of God, (the dual God) created he him, male and female created he them." The same solemn and mysterious declaration is afterward most emphatically reiterated. "This is the book of the generations of Adam. In the day that God created man, in the likeness of God made he him; male and female created he them; and blessed them, and called their name Adam, in the day when they were created."

Mr. Spencer is severe against anthropomorphism, but he must admit that Moses does not carry this natural fault so far as to declare that the "image and likeness" in which the human was created, subsisted in the form or bodily parts, or in the holiness or intelligence of man; but he expressly and repeatedly affirms that God created man in his own image *in this respect* that he created man, (the human), "male and female."

It is therefore too plain for argument, either that Moses believed that there were two Gods, (one male and one female) in whose image man was created, or else that the one God in whom Moses believed, was a Dual Being, self-existent, combining in one person both poles of spiritual sexhood, which faith we have seen to have been the common theism of all primitive races, and utterly antagonistic to the idea of evolution.

Moreover, Moses expressly informs us that up to a short time before the Exodus out of Egypt, the Israelites conceived God to be a Great Spirit, having about the same idea of Deity, that the red-men of America possessed, when the Europeans discovered this continent, and that the Dual God then revealed himself to Moses by the other essence of his dual nature, and assured him that he was not only God Almighty, *Elohim*, the Infinite Wisdom and Power, but

that he was also Jehovah, the Infinite Life and Love, and that this revelation was made in order to satisfy the doubting and complaining leader of the divine love for the chosen people. "I am Jehovah, and I appeared unto Abraham, and unto Isaac, and unto Jacob, as God Almighty, but by my name Jehovah, I was not known unto them." The account is given in full at Exodus V. and VI., and is curious and instructive, especially on the point that God was, according to Moses, one dual Spirit.

After God had created man (the human), he brought before man "every beast of the field, and every fowl of the air, to see what he would call them," in order that man might see that there was no creature that *'omoonusios*, consubstantial help-meet to man. Then God said; "It is not good that the man should be alone," (or one). Then he made a rib of the human into a woman, and distributed the dual human nature's female element into another form or person consubstantial *'omoonusios*, to the first form, and upon this identity of substance existing in different forms and persons was founded the institution of marriage. [Gen. 11, 23, 24.]

"Woman" and "Eve" were names given by the male to his help-meet; the very divine name was "Adam," "CALLED THEIR NAME ADAM, in the day when they were created."

The Talmudist say that human was created man-woman. Plato in his Symposium undertakes to account for amatory passion by which one man and one woman cleave unto each other of choice, by the declaration that the human was originally created androgynous, and that Zeus afterwards distributed the sexes into different forms of persons. Jesus Christ said that "Ye do err not knowing the scriptures" (*i. e.* of Moses) "for in heaven they neither marry nor are given in marriage; but are as the angels of God," meaning surely that our idea of sex is a physical differentiation, not essential to the human, except for the propagation of the species by natural generation in accordance with the Divine command, and that when we "shuffle off this mortal coil," that physical distinction ceases. And finally the physiologists inform us that up to a late period in gestation, the fœtal human has no sex.

The four Gospels tell us that Christ was 'begotten' of God, 'conceived' of the Holy Ghost, "in the beginning," before the creation; and the Fifth Gospel ('the Gospel of the Hebrews,' regarded by many critics as the original and authentic account) boldly and unreservedly states that the Holy Ghost (Jehovah) was the mother of Christ, ages before he was born of Mary; and the Christian church so taught and believed until Constantine subverted it, and established Ecclesiasticism upon the ruins of Christianity and Paganism, in order that he and other tyrants might rule over their fellow men "contrary to the scriptures."

Such was the Theism of Moses and

of the Prophets, and of the ante-Nicine church, taught from the very beginning; such was the Theism of all the primitive races before idolatry was known to mankind, a Theism certainly not less than forty centuries old; and an agnostic who can believe that "the ghost theory exhibits those steps quite clearly," by which these ideas concerning the supernatural evolve out of ideas concerning the natural," the first step being belief "in the fact that the other-self, supposed to wander in dreams, is believed to have actually done and seen whatever was dreamed," simply supplies us with a new illustration of the fact that the grossest intellectual errors are apt to follow the determination to apply physical laws to moral questions.

It is therefore simply to belie the facts if one say that "these ideas of the supernatural evolve out of ideas concerning the natural;" or if any one say that primitive faith was less perfect or less philosophical than it has since become "by the intellectual development which causes dissatisfaction with the crude interpretations previously accepted;" for the Theism of Moses is perfecter than that of Athanasius, and the theocracy of the law-givers was enlarged by the Prophets and perfected in Christ.

Mr. Spencer and the Agnostics are accustomed to speak condescendingly of the "Elohistic" and "Jehovistic" characteristics observable in the Pentateuch—is it true, then that these erudite gentlemen were ignorant of the *fact* that Moses in the fifth and fourth chapters of Exodus expressly states that prior to his own day the Divine being had appeared only as Elohim, but that He revealed himself to Moses as also Jehovah? "And Elohim spake unto Moses, and said unto him, I *am* Jehovah; and I appeared unto Abraham, and unto Isaac, and unto Jacob as Elohim, but by my name of Jehovah was I not known unto them".—Ex. vi. 2:3.

Not only does this article speak of comparatively modern nations among whom the primitive faith had long been overlaid by polytheism and idolatry, as if their "crude interpretations" were the original form of religion; but with a suavity that argues either dense and hopeless ignorance, or else finished and heartless duplicity, attributes to that true religion which God revealed to primitive man, and which was gradually developing from the days of Abraham all the monstrosities and abominations moral and intellectual which Constantine founded upon the ruins of the subverted Christianity.

"The cruelty of a Fejian god who, represented as devouring the souls of the dead, may be supposed to inflict torture during the process, is small compared with the cruelty of a god who condemns men to tortures that are eternal;" "the visiting on Adam's descendants through hundreds of generations dreadful penalties for a small transgression which they did not commit; the damning of all men who do not avail themselves of an

alleged mode of obtaining forgiveness, which most men have never heard of; and the affecting a reconciliation by sacrificing a son who was perfectly innocent, to satisfy the assumed necessity for a propitiatory victim; are modes of action which, ascribed to a human ruler, would call forth expressions of abhorrence."

Surely all these utterances are true! and it is also true that these worse than atheistic dogmas are the distinctive doctrines of Constantinism; but why refer to these horrible, *modern* ecclesiastical nightmares "in an account of the genesis of religion?"

Is not one guilty of a cruel libel upon Moses, and upon the Prophets, and upon John the Baptist, Matthew, Mark, Luke and John, and also upon Jesus Christ, when he ascribes these dogmas, or any one of them to the persons named, or any one of them? Moses never wrote one single sentence concerning "immortality," or "the life to come," or "a future state of rewards and punishments." No prophet makes the slightest reference to any such dogmas. John the Baptist preached all through Judea, and utterly failed to enunciate any such dogmas, and Jesus Christ Himself prescribed for His own disciples a form of prayer (the Paternoster) which contains not the least intimation of any such things as "immortality," "the life to come," or a "future state of rewards and punishments."

These dogmas were no part of the Revealed Religion, for "the Kingdom of Heaven" from the days of Adam down was the temporal government of God-Jehovah over the chosen people, in this world, and was not a "spiritual" religion, and had no reference to the world to come. The The only "salvation" contemplated in it was salvation from crime, hatred, violence, oppression, pauperism, in this world. It was the utter negation of human authority and the assertion of God's sole right to rule; and if a man will only dismiss all ecclesiastical "interpretations" from his mind, and carefully examine the Mosaic statutes concerning "The Lord's Release," "The Year of Jubilee," "slavery," "usury," and private property; he cannot fail to reach the conclusion that no state in Christtendom to-day possesses a social and political code so wisely devised to secure the common good, the public welfare, liberty, equality, and fraternity for all men, as was the code of Moses; nor can he fail to see that the prophecies foretold that under Christ these statutes were to be administered for all men, nor can he fail to discover that the very system of which the Israelitish kingdom was the antetype actually existed for about three centuries, and until Constantine subverted it.

He would beyond doubt leave such an examination with the conviction that every "account of the genesis of Religion" which fails to set forth the one indisputable fact that the Religion was, from the gen-

esis of it, a perfect system morally, socially and politically, and only became imperfect buman faithlessness and consequent degradation of the religious idea, is false in fact. He would percieve that those who speak of Jesus Christ as a "victim," and of visiting on Adam's descendants dreadful penalities for a small transgression which they did not commit," and of "damning all men who do not avail themselves of an alleged mode of obtaining forgiveness," *libel* the old Testament and the Gospel, and the Acts—and Moses and the Prophets, and Christ, for none of them ever taught or believed, any such things as these; they belong to Constantinism and not to Judaism, or to Christianity. He would perhaps discover it to be the direct, simple statement of a matter of fact to declare that mankind had in some way (which Moses symbolizes by his story of the eating of an apple in violation of the Divine command) fallen into a condition of conscious alienation from God, and all men were under conviction of sin, and that human endeavors to escape from this condition had filled the world with false religions from the dawn of time, and that the Son of God offered himself as the example of a mode of life by which man might become consciously at peace with God, by faith in him—a Divine "Enabling Act" suited to human incapacity. He might perhaps perceive that the Revealed Religion was divinely ordained to train men up to be fit for freedom in order that they might be holy; and *that apart from the Ceremonial Law*, the statutes ordained for the social and political regeneration of the Jews first, and of the Gentiles afterwards, were infinitely more wisely *adapted* to the accomplishment of that purpose than human legislation has ever been since to-wit; that the Laws of Moses were, and are unto this day, the best laws ever framed for any people; for while Christendom has borrowed from them, it has not improved them. He might finally feel a profound conviction that it is a sacred duty which every man of Mr. Spencer's ability, owed to his burdened fellow-man, to free himself from the strong and popular delusion that Constatine's ecclesiastical system which sanctifies the blasphemies of human authority, war, slavery, usury, and mammon worship, is the same Revealed Religion which from the days of Adam to those of the Nicene Council utterly repudiated all these infamies, and offered to mankind the only social and political system (based upon Faith)whereby it ever was, or ever will be, possible to banish crime, hatred, violence, pauperism and selfishness out of human life, and so regenerate the world; making, true Liberty and Religion possible for all men; and would see for himself that the Revealed Religion was never designed for anything but the temporal salvation of mankind, except in so far as it may be true that the spirit continues its own development in the

life to come, we know not under what conditions, nor to what end.

He would find that this system which was "Revealed," not "evolved," was imbedded in the law of Moses, and that the assertion of God's sole right to rule, the statutes against slavery and against usury, the statutes of the Lord, Release and the Jubilee (Lev. XXV.) were typical of it; that it was enlarged upon, and its full establishment foretold by the Prophets; that it was established by Jesus Christ, and continued for three centuries, and was rapidly regenerating the world when Constantine subverted it, and that the system of which the law was the type, the Prophecies the interpretation, and Primitive Christianity the fulfillment, was Faith plus Communism, the only True Democracy.

EVOLUTION IN THE ORCHARDS.

I have my family around me in my cottage, and we are a number of rather decided individualities, each one with peculiar features and tastes; but in my orchard there is a family of about the same age that is decidedly more positive and peculiar in its idiosyncrasies. The great rose family includes not only the rose and the briars, but the apples and the pears, and plums and cherries. Of these the apples and pears are generally associated in the orchard and are most closly related. Yet they must have come off from the parent stock at very different periods. I mean that the old rose ancestor had children that were apple-like and apple progenitors before it had pear-like children that were progenitors of the pear. The apple has certainly a much longer history than the pear, and has been much longer undergoing a civilizing process. You can see this in the fact that the pear reverts to thorn-producing very uniformly, while an apple is rarely found that has a trace of this primitive characteristic of the whole family. For at the outset not only rose-bushes were thorny, and blackberries and raspberries thorny, but apples, pears and all the rest of the cousins. The reason that some of them are not thorny to-day is that they have for a longer time been in possession of man, and not needing thorns have learned to leave them off. It is decidedly for the advantage of any bush or tree that has become an associate of man not to be thorny; for man is certain to reject the more thorny for the less thorny. While not objectionable to other fruit-eaters, thorns are very much in man's way. The result will be that in time such a characteristic will be eliminated from all fruits that are cultivated.

The raspberry has already made some moves in that direction till we have some excellent varieties that are nearly or quite thornless. If a

new variety shows itself among blackberries that has left off its terrible barbs it will be sure of survival as one of the fittest things in the garden. So we say the pear has not been with man as long as the apple has, because it has not learned to adapt itself so well to man's requirements.

This relative age of the pear and apple under civilization is also determined by the fragments found in the refuse heaps of the old Stone Age and the Swiss Lake dwellers. In their "kitchen middens" not more than a handful of fragments of pears have been found, while apples are discovered in abundance. As an ancient fruit it was a very small and almost worthless affair, and occupied but a limited area. Pliny and the poet Horace both refer to the pear, and Pliny says very explicitly that it could not be eaten unless cooked. So that historically the pear has a meager record, while the apple has a name in almost all languages, and is referred to by many writers as a notable fruit.

As true dessert fruits the pears date back only to the middle of the last century. The apple, on the contrary, is one of the oldest of eatable garden productions, dating back many hundreds of years, not only in Europe, but in a large part of Asia. It seems to have been brought into Europe by the earlier Aryans in a somewhat improved or selected state. At present we find in our orchards as a result of more recent selection a large number of special branches of the stock, varieties they cannot be called, as each group contains innumerable varieties, and those not species became established long before any pear was worthy of classification as a dessert fruit. The pippin got its blood so thoroughly fixed 200 years ago that its seedlings are distinguishable to-day all over the world. That is, in an orchard of seedlings, or in a wild thicket of apples, a good horticulturist is likely to find apples easily distinguished as descendants of the pippin line. They may be quite out of direct descent, and cross-bred to many degrees, yet by flavor, color, texture, shape, core, seeds, sutures, stem or otherwise, it is easy to determine the ancestry to be remotely pippin. Such family groups of pears we have, but very much less firmly established. When a variety of any fruit gets to be so positively traceable in descent we may be sure that it has been for a long while undergoing selective influences. Nothing is so hard to settle down to fixed idiosyncrasies as a sub-species. Break up a type and the tendency for a long while is toward infinite variation. Instability governs form or color or quality, or all these and other characteristics. I have over 200 cross-bred varieties of beans, which I have produced within four years. The trouble now is to fix the characteristics of any one of them, and stop the further propensity to crossing. The apple, however, has for a long while had what may be called horti-

cultural species, one of which I have referred to as the pippin; others are the bellefleur and gillifleur.

The apple has been so long man's companion and under the control of man that it has not only lost all recollection about thorns, but has been in many other ways civilized and refined. Now our word culture, as applied to people of a long line of educated generations, is a word borrowed from tree-growing and plant-growing. A tree is cultivated, that is, educated, by man's wisdom and skill. As a matter of fact, nature never quite forgets what she has once done. She likes to rehearse, just as we like to tell what we did when children. The frog never gets to be a frog until he has gone over his ancestral history as a tadpole. So the pear, if you sow the seed of a Sheldon, runs back to its ways of doing 10,000 years ago; only it may be that one seed in a hundred will tell the other story of progress. But the apple has very much less of this propensity to far backward looking. It is quite settled down to be content with civilization, and has even forgotten a good deal of what it once knew.

Now, we know that the great rose family, including pear, apple, quince, plum, almond, peach, apricot, rose, strawberry and blackberry, is peculiar in this, that it has developed a power to bribe insects and animals to do it some sort of service; for that really is what the strawberry and the apple and the other edible seeds are. They are temptations to induce the birds to eat them and so carry the seed about and sow them, and in that way enable them to spread and multiply. This bribing family never appeared on the earth until fruit-eating birds appeared—that is, the fruit-eating birds and the fruits for them to eat were created by evolution together. But, while it was a part of the business of these trees to get their fruits eaten, it was equally a part of their business not to get eaten themselves, therefore thorns were quite as necessary as nice apples and berries. The seeds evolved a power to swell out into receptacles of a pulp and juice agreeable to the birds, but they protected themselves against the browsing of animals as vigorously as they welcomed their feathered friends. The raspberry puffed out the whole ovary; the strawberry the seeds and ovary both. There was but one exception in the family to the thorn-producing. The strawberry or potentillas, nestling close to the ground, got a habit of running away from enemies and hiding, and so did not need to barb the noses of intruders.

And this went on after a simple sort for thousands of years. Strawberries, however, were but little more than dry seeds; and apples were only haws and other very insignificant things. But by and by man appeared on the scene, and though he at first had but little more taste than the other animals, he had just one thing more, a power to educate his taste. And as he educated his taste

he took the rose family out of the hands of nature and began to educate that too; just as he began to educate the wild beasts and make them tame ones. It was slow work, both with himself and with his pupils. All the steps we can't trace. But here we both are after 100,000 or 200,000 years and the result is quite satisfactory.

The bribe that the pear and apple offered at first to the birds and animals is largely withdrawn from them and offered now to man. They don't care whether animals like them or not, it they can only gratify our palates. I mean they don't much care, the really civilized members of the family do not. The apple, especially, has got quite used to catering for our markets. And the pear will after awhile get to be of the same mind. Of course there are a good many barbarous branches of the family, as there are savage tribes of men; and they will just be grafted, for it won't pay to work at them in the slower way of natural selection. Still once in a while the survival of the fittest gives us a Seckel pear right out of a wild tribe like Red Jacket or Scenondo among aborigines. So the apples, pears and berries of to-day are such as suit the palates of men and not of the birds.

But that is not all; they do not any longer have to protect themselves against being eaten up, and so they have stopped growing thorns. The apple tree has found out that it is safe enough without growing thorns. It is men's interest to protect it. And the pear after a few hundred years more, or may be less, will find out the same fact. A good many have already settled down to a thornless way of growing. Gradually everything takes into consideration man's habits and tastes and fits to them.

Will the roses shed their thorns also? Some of them, those longest in man's company, have already done so; but the tendency in some species or varieties to revert to thorns in seedlings is yet very marked. This will all be forgotten in time. And by and by our gardens will surely contain only varieties of berries that any lady can pick without being troubled with a survival of barbarous characteristics. The thorns will all be gone.

Now, I want you to observe the tendency of evolution in another way. It works in the same way with apples and pears and roses and men. I mean the tendency to individualize or concentrate its form, not on number, but on quality. This innovation came in when man was created, but it was passed over slowly to everything else that comes into man's closer association. Here is a wild-thorn apple growing beside a Northern Spy. In May they are equally profuse in bloom, because blossoms are for the eyes of insects as well as men; and the insects must be attracted to do an enormous amount of fertilizing, and take their pay in beauty and honey. But in June the flowers are all off. The Northern Spy forgets about the birds and thinks only of

man. So it throws away nine blossoms, and with the remaining one it goes to work at producing a great apple that shall be picked in October by man, and eaten by him, and so please him that he will protect that tree and graft it everywhere. On the other hand the wild apple does nothing of this sort. It does not know man nor consider him; it is a wild, untamed nature, and still thinks only of the birds. So for every blossom it produces a fruit, but every fruit is a little hard bitter affair that no man can eat. Here you see nature is making in the Spy the high-bred, costly individual, and this is what has lately been going on in our orchards. Just as in modern society the aim is to bring out superb men, instead of masses of human beings. But what of the wild haw or thorn apple? It has fallen under culture in another direction. Man does not care to educate its fruits, but he has found that he can educate its blossoms. Some haws and other thorns were found to vary slightly in color and size of flowers, and as man lives not only to eat but to see fine things, he has selected these to be preserved, and so we have now scarlet flowering and double flowering crabs and haws.

But all this while man himself has been a creature of evolution quite as much as the things he cultivates. His senses, and especially his taste has grown to be a very different affair from what it used to be. He will not eat now what a few generations ago was eaten with satisfaction. It would be hard to bribe a party of horticulturists to eat a Bon Critica pear, that fifty years ago was readily eaten by their fathers; or a belle pear, whose name indicates the opinion held about it. It is not unlikely that fifty years from now, that prince of good pears, the Sheldon, will be quite behind the cultured palates of our children. There are doubtless bad flavors in the Seckel and Anjou that you and I cannot discover, but which will some day be fully apparent to daintier tastes. Evolution is a purpose in nature that aims at better things all the time, and so it makes men as well as men's foods to improve.

Daintier birds as well as daintier men are the result, and always will be the result. And then daintier fruits will be needed, and whatever is needed will be sure to be supplied. And so it will go on, better men demanding better foods; better fruits demanding better men. The possibilities hidden in this grand rose family are almost as great as those hidden in man himself. The quince, which is also one of the same family, has a hint of some wonderful things that may not be brought out in long ages. The berries are marching on very rapidly. We shall have strawberries, in time, as large as eggs, and richer in flavor, than we could now appreciate if we had them. With daintier men come daintier birds. Robins are one of the more fastidious sorts that have grown up as a re-

sult of man's culture. He will on a pinch, eat a great many poor fruits, but he knows a good one when he can get it. He lives with us, not because he admires us, and our cats, and wicked boys, and ornithologists, and specimen hunters, but because he has a taste educated to the fruits he can only find in our vicinity. He is spoiled for wild life. Indeed the robin red-breast is purely a product of civilization, appearing only with man. And the cat-bird is being spoiled as fast as possible, for anything short of the finest cultivated raspberries and green peas. And we have several more birds on the same road. They can eat the old bitter berries when driven by hunger, but they have learned to know good fruits when they find them. The same is true, unfortunately, of some pestiferous insects.

So you see our apples and pears are members of a very curious family, and have a very interesting history, and a great future ahead of them. The two families that move along together, the very highest representatives of the culture of the vegetable kingdom and of the animal kingdom, are the rose family and the human family. Indeed, neither one could have become quite what it is but for the other. And if to-day the rose family should be obliterated I think it would go very hard with us to keep up our civilization.

THE KHETSHUA (Qquetchua) LANGUAGE.*

This publication of the renowned Swiss scientist and traveler, is summing up the results of a whole lifetime's assiduous studies upon *one* subject. To Tschudi's initiative and close observation, we are indebted for much of our scientific knowledge of the Peruvian people, language and antiquities, and for the last forty years his numerous publications on Peru are reckoned among the most thorough accounts on that distant and, in many respects, mysterious country. The main part of the volume before us is devoted to a free discussion of the grammatic peculiarities of Khetshua and its sister-dialects. Modern views and methods of treating grammatic subjects are adopted by the author; scientific precision is not coupled here with that dryness of style, which clings to the majority of books on grammar, and to linguistic treatises, and discourages so many readers from attacking the subject. Frequent comparisons with languages of other South American countries bestow peculiar attractiveness upon the subjects under treatment. The chapter on syntax is but short, for Khetshua, as well as many other synthetic languages, have syn-

*Von Tschudi, J. J., Organismus der Kletshua-Sprache. Leipzig, F. A. Brockhaus, 1884. 8 vo. XVI. and 534 pages.

tatic rules simple in the extreme; valuable additions to the volume are three long Khetshua texts with commentaries and an excursus upon the Chinchay-suyu dialect. The phonetics of the language are discussed at length, and the polemics of the author against other grammarians, especially Pacheco-Zegarro, fill many pages. The difficulty of the subject, which requires many other explanations besides, and the general importance of phonetics for the grammar of any language, sufficiently excuse these polemics. Pp. 92 *sqq.* embody a full bibliography of authors on the Peruvian dialects. The preface contains many statements of great interest and information of a startling and novel character. The historian, Garcilaso de la Vega, mentions a language spoken only by the Inca (members of the dynasty); it was considered divine, and the people were prohibited from acquiring it. But the eleven words which he mentions, and supposes to have been a part of the "Inca vocabulary," are either pure Khetshua terms or reducible to Khetshua radicals, and hence we fully approve Tschudi's opinion when he rejects the existence of the secret language altogether. What gave origin to Garcilaso's statement was probably the admixture of a few archaic words in the language used at court. The common language of Peru was first called *Khetshua* by the monk Domingo de S. Thomas, in his Dictionary of 1560, whereas the chroniclers before him called it, *lengua general del Peru; lengua cortesana; lengua del Cuzco; lengua del Inca.* The Khetshua *tribe* was one of many other tribes speaking that language, and during this century dwelt in the province called Andahuaylas; but why S. Thomas called the language by the name of *that* tribe, by which it is still named, is an unsolved problem, and the signification of the name is unknown.

The linguistic families of South America, are discussed pp. 26-30; 82 199, and a frank avowal is made of the enormous difficulty experienced in classifying them scientifically. The dialect of the Peruvian family, that is the sister-dialect of Khetshua, are sketched in detail (pp. 66-82), and the dialect commonly called Aimara relegated to another family of languages, the Kol'a. Ludovico Bertonio, an Italian Jesuit, wrote a grammar and a dictionary of that sonorous language, published respectively in 1603 and in 1612. This language is nothing else but the Lupaka dialect of the Kol'a stock, though introduced under the misnomer Aimara. Aimara was, says the chronicler Ramos, the name of one of the tribes, from which individuals were brought by the Inca Kapak Tupanki, to the shores of Lake Titicaca, and settled there as colonists; they spake a Khetshua dialect. Tschudi refutes every genealogic connection between Aimara, which is still spoken in Peru, and the Lupaka of Bertonio, although he states that the latter was largely influenced

by Khetshua, especially in its lexical elements.

Thousands of years before the Inca dynasty ruled the country, Khetshua was spoken in the same valleys where we find it spoken now; but which tribe or nation spoke it first? Contrary to the common opinion, that the Cuzco and Puno districts are the cradle of it, Von Tschudi's researches led him to assume, that the original Khetshua-speaking people came from the North, spread out for a while in the countries extending between the Andes and the Upper Amazon River, then slowly advanced toward the Huaraz, and finally reached the "lagune of Titikaka," where warlike tribes checked their futher advance. The dialects of Quito and Chinchaya, contain more archaic forms than those of the South, and hence the language probably originated in the North.

"Red men," the vulgar designation adopted for the Indians, is a mistranslation of the term *hombres colorados* of the earlier Spanish chroniclers. This term has to be rendered by *men of color*, *men showing color*, and not by *red men* or *redskins*, for the natural color of the Americans is rather brown than red or anything else. Von Tschudi states that in America the natives of countries showing the lowest medium temperature possess the darkest, of highest medium temperatures, the lightest complexions, *though there are exceptions to this law*, (a large number of exceptions, we think). The fact that every family of Indian tribes or languages possesses a distinct and different name for the Indian corn or *maize* leads him to the conclusion that this plant probably did not come from one original species, or travel from one original district to all the innumerable tribes of America. Maize is indigenous in America, but is nowhere found in its wild state at the present time, (p. 47, note). The difference in the aboriginal terms for maize does not prove much, we think; for when it was first imported into Europe, it came there under the only name of *maize*, (mahiz); now almost every European language has a different term for it. The momentous problem of the unity or plurality of creation-centres for *man* is mentioned by our author with the remark, that with the scientific facts now at our disposal we can not solve it, and that Darwinism, with its "entire apparatus of truth mixed with poetry" is just as powerless in that respect, although "in its well-known modesty" it has not been slow in giving its own solution.*

There is no uniform type for native skulls in America or elsewhere; complexion proves nothing for the original racial condition of a tribe, nor does community of customs,

*J. J. Von Tschudi evidently confounds Darwin with his followers, the evolutionists. The last mentioned blemish may be inherent to a few of the latter, but Darwin himself was a model of modesty.

habits or religion (pp. 8-10). Whether we subscribe to all the above opinions of Von Tschudi or not, his book will have one good effect; to set us thinking about anthropological questions in general and South American ethnography and linguistics in particular.

PROGRESS IN ELECTRIC RAILWAYS.

The latest periodicals are full of interesting descriptions and drawings of new appliances of electro-motive force to car locomotion. The following is a statement of the various attempts in this direction at different localities. The descriptions are condensed but retain the salient points in each system.

NEW YORK CITY.

One of the results of the meeting of representatives of the various electric railways in New York, last fall, has been the inauguration of the Daft System on Ninth Avenue, commencing at 14th street, in that city. A third rail has been laid on this line which is insulated by a patent device to prevent water from making connections from rail to sleeper in unfavorable weather. The steam-power consists of a large Wm. Wright engine with necessary accessories. Three fifty-horse Daft dynamos, of which two are in position, will generate the current, which is carried through the streets, upon poles, to the rails. The motor used in this experiment will be fourteen feet six inches long and six feet nine inches wide and will weigh nine tons. The principles of its applications may be briefly described as follows: The motor is mounted upon a truck, directly over the driving wheels, so that it turns on an axis at one end and may be lowered or raised at the other by a screw. The power is transmitted directly from the motor to the wheels by a grooved friction-gearing which consists simply of two parts, one keyed to the armature shaft, the other to the drive-wheel shaft. The pressure of the friction gearing is regulated by the screw which raises and lowers one end of the motor; this screw being useful also to raise the motor entirely away from its friction bearings. The supports of the motor are heavily cushioned with rubber as well as the trucks themselves. The connection with the middle rail, the conductor in this system, is by means of a heavy bronze wheel, fourteen inches in diameter, which may be raised or lowered at will. The contrivance for controlling the motor is placed at the outer end of the car, and consists of a sliding-contact device which raises or lowers the resistance in the field-magnet circuit. Of course this method diminishes, or increases, the speed of the motor by diminishing or increasing the amount of current.

There being also a cut-out in circuit, it is possible to run fast or slow, or to stop the car by this device alone, while it also possible to stop the car by the friction wheel. There is also an automatic signal device which warns the engineer of trouble on the road. The reversing gear is of the simplest character—four contact brushes which can be applied alternately in pairs. Ordinary hand-brakes will be used at present but some form of air or electricical apparatus will be used hereafter.

The Edison and Field companies have combined and are preparing to test their system on the Second Avenue line. Their steam-power is a 250 horse Whitehall & Smith engine, with accessories. On account of the high electro-motive force used (600 volts) the central rail (which conducts the current) must be carefully insulated. This is accomplished by supporting it on glass shoes protected by rubber strips from jars and vibrations. Since the commencement of their experiments these companies have changed their devices several times; but the latest is as follows: Each car is provided with a motor, thus being independent; and it is thought that by this means the strain from the traction required to move a heavy train will be evenly distributed. The motor is placed beneath the car floor on an extension of the truck. This removes the center of gravity of the car to a point near the driving-wheels, which are, of course, nearest the motor, and these must be depended upon for traction. The motor used is a compound-wound Siemans which gives 600 revolutions per minute by the use of an electro-motive force of 600 volts. The power is transmitted from the armature of the motor to a pulley, by means of a Weston friction-clutch, which is governed by an ordinary brake-wheel. From the pulley the power is taken to the driving wheels by a heavy leather belt. The tension of the belt may be varied by moving the motor back and forth or by means of an "idler," which also serves to give more bearing surface for the belt. Contact with the conductor is made by means of sliding brushes which are mounted on the ends of bars that keep them suspended when another road is crossed. The brushes are so arranged that they can turn, on reversing, and thus always drag: this gives a uniform current when passing joints etc. An extra pair of brushes, as in the Daft system, is used for reversing. Speed will be controlled by the friction brake, the motor running at a constant speed. The Eames vacuum brake will be used.

PHILADELPHIA.

Permission has been given the American Electric Railway Company to lay a conduit and experimental line on Ridge Avenue from the depot at Dauphin Street to Laurel Hill Cemetry. The work will begin in a few weeks. The company, says the *Electrical Review*, at first intended to lay its experimental

tracks in order to demonstrate the applicability of the electric motive power in Fairmount Park, and obtained authority to this effect from the Commissioners, but subsequently the decision was made to lay down a conduit and establish a plant in connection with an existing railway as a better means of demonstration to the public and those interested in electric railways.

Ridge avenue was chosen because of the peculiar grades, and in order to show the superiority of the new motor over horse-power in surmounting them in all weather.

The Electric Company will next week start work on its shop and engine-house. One car, provided with a motor, will be run at first, and this will not interfere with the trips of the regular horse-cars. The car will be one of the ordinary cars altered for the purpose, and will carry as many passengers as usual, the idea being to give the two motive powers a fair test, the claim being that the electrical is greatly the cheaper. The conduit will be laid so as to avoid interference with the travel of the horses, and the tracks will not be disturbed.

In shape the conduit will somewhat resemble those laid by the Traction Company, but will be of heavy timber, instead of iron, below ground. It will be braced inside with iron knees and provided with drainage facilities. Running along beneath the top will be the compound conductor of copper and iron, half circular in shape, well insulated and protected from damage from outside influences. On the top of the conduit forming each side of the slot, which will have a half inch opening, will be iron plates about five inches in diameter altogether. This slot opening will not be directly in the center of the track, but to one side of the meridian line.

The current will be transmitted by an ingenious contrivance from the conductor underground to the motor in the car, and will be under instant control of the driver or engineer. At intervals of eighteen feet plates will be arranged over the conduit, which may be readily removed for repairs and other work, and without removing the body of the conductor. The bottom of the conduit will be cemented previous to filling in the ground about it. A speed of seven to ten miles an hour is claimed for the experimental Ridge avenue line, and a saving of $2.50 to $3 per car over horse-power. The engineers are sanguine of the success of the electric street railway.

BALTIMORE.

"The various trials of the Daft electric motor on the Union Line Track, Baltimore," says the *Electrical Review*, "have been so successful that cars are now to be run regularly. Fifteen miles an hour was the rate of speed at a recent test. Considerable trouble has been caused by the contact of animals and human beings with the middle rail, which is

highly charged with electricity. On Monday, several Hampden boys experimented with the rail and were severely stunned. A horse belonging to N. A. Cornelius stepped on the rail at Mount Vernon switch and was so shocked and surprised that he kicked the harness and shaft all out of repair. Another horse attached to a cart loaded with stone was knocked down by contact with the rail and badly cut. A horse belonging to W. H. Ortloff, a butcher, suffered the same fate, and, in expressing his feelings, he wrecked the harness. A flock of geese perched upon the electrified rail at Hampden Hall; they were knocked in all directions; one was hurled five feet in the air. A dog who witnessed the unusual commotion among the feathered bipeds, went to investigate the matter. As soon as he touched the rail he turned a double-somersault, and picking himself up, went off yelping. Notices have been posted along the track warning people to keep off the central rail."

It was upon the Union Railway that the recent experiment with the Bauer storage cells, noted in the August REVIEW, was made. From later information it appears that forty-nine cells were placed on the car, of which but twenty-nine were used on level ground and thirty-nine or forty-nine afterwards connected as the grade required. Eighteen persons were in the car, which, with the weight of the car, motor, etc., made a total of five and one-half tons. The car moved out of the yard, passing over grades of 235 feet to the mile, and around curves of 75 feet radius, with ease and comfort. The batteries of one-fourth horse-power each, were made for incandescent lighting but seemed to answer the purpose admirably. The loaded car made six miles per hour on level ground. The total value of the 49 cells used was 8.6 horse-power.

CLEVELAND, OHIO.

Since August last year the East Cleveland Horse Railway Co. has substituted electricity for horses as a motive power, and, notwithstanding the most trying ordeals, the experiment has been successful. In this system the electric conductor is placed in a conduit which runs between the rails. This conduit is slotted throughout its length and a conductor from the car is thus enabled to gather up the electric force. The conduit is kept clean automatically and provision is made for removing snow from the tracks.

DENVER.

In Denver, experiments of a thorough and costly nature are being made, to determine the best system for use on the line already constructed by a company of capitalists. Prof. Thompson, the electrician of the company, has not determined upon the system to be employed as yet.

CANADA.

The Vandepoele Company of Chi-

cago, whose motors and generators are used on the Kansas City line, has secured a contract for building an electrical railway at Toronto, Ont., to carry the passengers to the coming Industrial Exposition there. The railway which the Vandepoele Company had there last year, an experimental one, is said to have been a perfect success, and to have carried 200 passengers to each train. The present railway will be extended to the city railways, and it is to become a permanent institution,

GREAT BRITAIN.

Probably the first Electric railway constructed in Great Britain, was the one running from Port Rush to Bushnells, near the Giants Causeway, in the north of Ireland. This system derives its power through the rails, and, while expensive and crude is very interesting, and, it is said, pays good dividends on the investment.

Several tramways, as the English call them, are either in operation or in process of construction in England. Among them may be mentioned the Blackpool Electric Tramway, lately completed. One of the cars built for this road, now running at the Inventions Exposition, has carried as many as 2,200 passengers in one day. Unfortunately the Board of trade has refused to allow the road to be opened, on account of faulty construction.

Another venture in this line is the Bessbrook and Newry Electric Tramway, on which the recent accidents occurred during an experimental trip. The accident was almost a duplicate of the cable-road accident on the inclined plane, in Kansas City; the brake apparatus did not work and the car shot down a grade with tremendous speed. The electric power had been cut off and hence the motors could not be reversed.

The *Telegraphic Journal and Electrical Review* (English) describes a new electrical locomotive as follows: "We understand that there is at present in the works of the North Metropolitan Tramway Company, an electrical locomotive intended for use upon that company's line. This engine has been running on a private line for several week's, and, so far, satisfactorily. The locomotive is ten feet long by six feet wide, and externally is very much like the steam locomotives at Stamford Hill. The system adopted is that of using accumulators as the motive power, and the laminated armature of the motor is of Walker's construction, having eight divisions and 31 coils. With a current of 38 Amperes, and at 800 revolutions per minute, the motor developes 32 horse power, its weight being 287 pounds."

It is rather difficult to determine what it is that weighs 287 pounds. A motor of that weight would scarcely give that much power, and the accumulators necessary to produce the power, would certainly weigh more than 287 pounds.

In the system just noted the gear-

ing is upon Elieson's lever-transmission patent. The motor revolves upon an axle which communicates motion to the driving wheels through a set of differential mitre wheels, the speed ratio bing 1 to 8.5. The reversing motion is accomplished by means of clutches upon these wheels, the motor revolving always in the same direction.

The Reckenzaun system, wherein the electric force is supplied from accumulators, may be briefly described as follows: There are two motors driving each car, of nine horse power each, and each weighing 420 pounds. Each motor rests upon a bogie, one axle of which is a driving axle, both bogies thus giving four small driving wheels. The necessarily high speed of the motors is reduced by means of a worm on each motor-shaft and worm wheels on the driving axles, which gives a ratio of about 1 to 12. Speed and power are varied by means of a compound switch which arranges the motor circuits, so that the machines shall work in series. The driver uses one hand for all the operations of starting, stopping and varying the speed or power. There are two brakes, one the old form the other electrical.

THE CONTINENT.

The Siemans Electric Railway, constructed in the suburbs of Berlin, is one of the most successful and satisfactory thus far constructed. In this system the conductor is a hollow tube erected on posts beside the track. This tube has a continuous slit in its under surface through which brushes are introduced and dragged along to gather up the electrical energy. Wires are attached to the brushes, and conduct the power to a motor in connection with the shaft of the driving wheels.

This system is similar to that of Mr. J. C. Henry, of Kansas City, insofar as the conductor is carried on supports along the track. But the sliding contact of the brushes causes "sparking" and consequent deterioration and waste in the conductors as well as the brushes. Mr. Henry's device is a rolling contact which does not cause "sparking."

The *Electrical Review* (N. Y.,) calls attention to an excellent example of an important electrical mineral line. "This line is now in operation at the Paulus-Hohenzollern Collieries in Upper Siliesia. The line, which is 800 yards in length, has been constructed for a traffic of 400 tons of coal in ten hours. This result Messrs. Siemens and Halske have guaranteed. The electrical locomotive weighs two tons; it is controlled by a specially devised regulator, which is said to give great satisfaction to those in charge of the train, by its prompt and certain action. The insulated conductor consists of flat iron bars, galvanized at the ends and connected by means of fish plates. This conductor is suspended from the roof upon insulators. Brushes on the locomotives take the current from the conductor.

The line is connected with the generator by cables about 250 yards long. The generator is driven by a belt from the flywheel of an engine. The trucks weigh 10 cwt. each, and have a capacity of 11 cwt. The train is composed of fifteen trucks, so that the useful load hauled is a little over eight tons, and the whole load nearly sixteen tons. With this load a speed of seven and a half feet per second is reached. With an empty train the speed is 12 feet a second. At present the output is not sufficient to require the maximum transport of five hundred tons a day."

There are several lines in operation or projected in and about Paris. Probably the most useful of these is the one which has been in operation for several years, to the bleach-fields of *Breuil en Auge.* It transports the linen to the grounds with a cleanliness that could not be expected if steam were used. In this system 60 Faure accumulators, carried in the tender of the train, provide the electro-motive force.

In conclusion it is hardly possible to predict the extent and importance of the uses to which electro-mtoive force may be hereafter applied.

No one who is informed on the subject will maintain that there is a doubt of its successful application to motor purposes on street railways.

PRE-HISTORIC AMERICA.*

This is a companion volume to its learned author's "Les Tremiers Hommes et les Temps Pre-historiques," which dealt with the Stone Age in Europe. There is no lack of treatises in both English and Continental languages on this latter subject, and the expositor has the easy task of treading in well-worn footsteps. The uniform character of the relics of Palæolithic man, unearthed in thousands from river-gravels and bone caverns, has left little play for archæological vagaries or few speculative fancies concerning their makers. But it is otherwise with the pre historic races and those often stupendous relics of the New World which have long been looked at through the magnifying and tinted glasses of the romancer and the sciolist, and have been invested with the glamour and mystery in which ignorance covers its nakedness.

"Among the crude and imperfectly-digested hypotheses which have engaged the attention of untrained ethnologists, none have been more popular than those which ascribed the origin of the Americans to full-fledged races, such as we know at present in other regions of the world. Among those who have been claimed as the original or genuine ancestors of the Americans are the Chinese, the Japanese, the Ma-

*From Knowledge for July.

lays, the Egyptians, the Phoenicians, the Basues, the ten lost tribes of Israel, the early Irish, the Welsh, the Norsemen, some unknown Asiatic Freemasons, and other equally unknown Buddhists. Volumes have been filled with the most enthusiastic rubbish by men upon whose ability and sanity in other matters, nothing has ever thrown a "doubt. Fortunately the era of such speculations is passing away. The scientific treatment of anthropological subjects is no longer the exception."

"The "ten lost tribes" still linger with us, and doubtless will continue to do so for some time, probably becoming in their turn the subject of investigation by psychologists interested in aberrant mental phenomena. But every day increases our knowledge of the true constitution of savage society, and builds a more enduring barrier against the floods of pure hypothesis."

The foregoing extract is a guarantee that we have in the present work a sober contribution to a subject which, under the treatment it now receives, falls into its relative place in the general science of human culture. M. de Nadaillac's volume covers more ground than the title indicates, the larger part of it, and that necessarily the most copiously illustrated, having more interest for the antiquarian than for the anthropologist; but in the earlier and latter chapters, as well as in references to cosmogonic legends and practices scattered throughout the work, the anthropologist will find enough and to spare of interesting and suggestive matter.

In all that the author and his American editor (from whose revision the book has largely gained) have to say concerning the co-existence of man with mammals now extinct, concerning the character of his earliest known relics and the deposits in which they occur, concerning his place in the geological record, the reader will be struck with the parallelisms between pre-historic peoples of the Old World and the New, with the proofs of the strictly analogous phases of culture through man has everywhere passed in his ascent from savagery, and with the absence of any essential physical difference between races, their unity, as the author remarks, "standing out as the great law dominating the history of mankind." Of course they did everything on the biggest scale in America from the earliest times. The kitchen middeus, or refuse and offal heaps which are scattered along the shores of the Baltic, although of considerable size, are very "small pumpkins" to the like shell heaps and samboquis along the Atlantic and Pacific coasts, some of which cover many acres and reach a height of forty or fifty feet; the more remarkable mounds, to be referred to presently, are, compared to the tumuli of the Old World, as the Himalayas to the Mendip Hills; the pyramids challenge comparison with the famous pyramid of Cheops;

the palaces vie with the classic ruins of the Palatine; and the megalithic remains would enclose a mightier ruin than the broken circle of our Stonehenge. In the summary of evidence concerning man's antiquity in America, the cautious spirit in which the author approaches the problem is apparent, He has not listened to the charming of the French Savans, who find human relics in the middle tertiaries in Europe. Although agreeing that man lived before the glacial epoch in North America, he recognizes the difficulty of fixing the precise time of his appearance, and in the uncertainty which attaches to the exact deposits in which certain relics of him—notably the Calaveras skull—occur, wisely leaves the question open. But the main interest of the volume gathers round the exhaustive account which the author gives of the thousands of artificial mounds in the great river valleys south of the Rocky Mountains, and along the Gulf of Mexico, through the length of the Southern Continent. They appear to have little or no relation to the burial mounds scattered over Europe and Asia, and which are referred to pre-Aryan tomb-raising peoples, being unlike in their fantastic shapes, and apparently intended for defensive and sacrificial, as well as sepulchral purposes. Many of them are of geometrical form, oval, square, round, more rarely, polygonal or triangular, either rising from hill summits, or standsolitary on plains, or enclosed within earth-walls. In some parts of the far West, the mounds represent mammals, birds and reptiles; indeed, some bold architects have not hesitated to attempt to imitate the human body. In Wisconsin "they represent men with the trunk, head, arms, and legs still recognizable; mammals sixty-five yards long; birds with outspread wings measuring more than thirty-two yards from tip to tip; reptiles of colosal dimensions, and, lastly, Pigeon mentions having seen in Minnesota a huge spider, whose body and legs covered an acre of ground." The cyclopean character and varied forms of these mounds led superficial inquirers to attribute them to some mysterious race of "giants in those days" which has completely disappeared, and with which the extant Indians of the Americas have no affinity. That the works are of a vast and undetermined antiquity is unquestioned, for as with the rough measurement of the deposition of remains beneath the successive layers of trees in the Danish peatbogs, the lapse of a long period is evidenced by the generations of varieties of trees which cover the mounds. And it, as M. de Nadaillac points out, we look among existing tribes for the lineal descendants of the Mound Builders, we may look in vain, since the richest, the most cultured, and the most sedentary of the Indians existing when the white race poured into America like a resistless flood, have been destroyed; of many tribes none remain,

of others, only a feeble remnant, which has readily adopted the methods and art of the dominant race. Nevertheless, the conclusion at which the author in agreement with the leading authorities, arrives, is that expressed by Dr. Brinton as follows: —"All these earthworks—and I am inclined to assert the same of the whole of those in the Atlantic States, and the majority of the Mississippi Valley—were the production, not of some mythical tribe of high civilization in remote antiquity, but of the identical nations found by the whites residing in those regions." To which may be added the opinion of Schoolcraft. "There is nothing indeed in the magnitude and structure of our western mounds, which a semi-hunter and semi-agricultural population like that which may be ascribed to the ancesters of Indian predecessors of the existing race, could not have executed." The state of relatively high culture which these races, while still in the Bronze Age, had reached, is described in a profusely-illustrated chapter on their tools and weapons, and to this succeeds a striking account of the ruined bee-hive-like pueblos or communal villages built in valleys once fertile, but now barren and deserted, or on cliffs accessible only by ladders or by steps cut in their sheer sides.

Such sites were obviously chosen, like those of the lake dwellers in Central Europe in the past, and in New Guinea and Central Africa today, for security against fierce and dangerous enemies. But, an enemy more irresistible than these—diminished rainfall through destruction of forests, and censequent barreness—effected the decay of these energetic dwellers in the rocks.

The ruins ot Central America and Peru; temples—scenes of revolting rites—and palaces obscured in the densest vegetation, statutes, idols, bas-reliefs, rock paintings and sculptures, the grotesqueness of the art unredeemed by any feeling of the beautiful, Nature alone festooning them with her wild loveliness; the rise of the famous dynasties, Aztecs and Incas, are the subject of copiously-illustrated chapters, which narrate in easy flowing style the story of these ancient civilizations. In the final chapter, which is mainly the work of the American editor, the origin of man in the New World is discussed, and the conclusion deduced from the general laws of geographical distribution and from the physical characteristics of the several races, is that he is not anthochthonous.

A Copious index completes the usefulness of a book which is indispensable to the anthropologist.

NATIVE AMERICAN DOGS.*

The impression that the domestic dog of the old world has descended

*From the American Naturalist for September.

from wild species distinct from the wolf may be well founded, but in America the evidence tends to prove that the Eskimo, and other domestic varieties of dogs were domesticated by the aborigines and used by them long anterior to the discovery of the continent by the Europeans, the varieties in question originating from the gray wolf or prairie wolf. First as to the Eskimo dog. From the following extract from Frobisher it appears evident that the Eskimo had the present breed of domestic dogs long anterior to the year 1577. Frobisher's account of the Eskimo themselves is, so far as we know, the first extant, and is full and characteristic. After describing the natives he goes on to say: "They frank or keepe certaine dogs not much unlike wolves, which they yoke together, as we do oxen and horses, to a sled or traile; and so carry their necessaries over the yce and snow from place to place; as the captive, whom we have, made perfect signes. And when those dogs are not apt for the same use, or when with hunger they are constrained for lack of other vituals, they eate them, so that they are as needful for them in respect of their bignesse as our oxen are for us."

Regarding the Eskimo dog, Richardson remarks in his Fauna Boreali-Americana, p. 75: "The great resemblance which the domestic dogs of the aboriginal tribes of America bear to the wolves of the same country was remarked by the earliest settlers from Europe (Smith's Virginia), and has induced some naturalists of much observation to consider them to be merely half tamed wolves (Kalm). Without entering at all into the question of the origin of the domestic dog, I may state that the resemblance between the wolves and the dogs of those Indian nations, who still preserve their ancient mode of life, continues to be very remarkable, and it is nowhere more so, than at the very northern extremity of the continent, the Esquimaux dogs being not only extremely like the gray wolves of the Arctic circle, in form and color, but also nearly equaling them in size. The dog has generally a shorter tail than the wolf and carries it more frequently curled over the hip, but the latter practice is not totally unknown to the wolf. * * * I have, however, seen a family of wolves playing together, occasionally carry their tail curled upwards."

The Hare Indian dog is also supposed to be a domesticated race of the prairie dog, as shown by the following extract from Richardson's Fauna Boreali-Americana, "*Canis familiaris* var. *B lagopus.* Hare Indian dog. This variety of dog is cultivated at present, so far as I know, only by the Hare Indians and other tribes that frequent the border of Great Bear Lake and the banks of the Mackenzie. It is used by them solely in the chase, being too small to be useful as a beast of burden or draught." It is smaller than the prairie wolf. "On comparing live

specimens I could detect no marked difference in form (except the smallness of its cranium), nor in fineness of the fur, and arrangement of its spots of color. * * * It, in fact, bears the same relation to the prairie wolf that the Esquimaux dog does to the great gray wolf."

Another variety of Indian dog is Richardson's *canis familiaris* var. *D novæcaledoniæ*, Carrier Indian dog. The Attnah or Carrier Indians of New Caledonia possess a variety of dog which differs from the other northern races. "It was the size of a large turnspit dog and had somewhat of the same form of body; but it had straight legs, and its erect ears gave it a different physiognomy."

The spitz dog, Mr. J. A. Allen informs us, is with little doubt a domesticated subarctic variety of the prairie wolf.

Sir John Richardson in the Appendix to Bock's Narrative, Paris, 1836, p. 256, remarks: "Indeed, the wolves and the domestic dogs of the fur countries are so like each other, that it is not easy to distinguish them at a small distance; the want of strength and courage of the former being the principal difference. The offspring of the wolf and Indian dog are prolific, and are prized by the voyagers as beasts of draught, being stronger than the ordinary dog."

The origin of the ordinary Indian dog of North America is obscure, but Richardson, who names it *Canis familiaris* var. *C canadensis*, North American dog, throws much light on its origin:

"By the above title I wish to designate the kind of dog which is most generally cultivated by the native tribes of Canada, and the Hudson Bay countries. It is intermediate in size and form between the two preceeding varieties, and by those who consider the domestic races of dogs to be derived from wild animals, this might be termed the offspring of a cross between the prairie and gray wolves. * * * The fur of the North American dog is similar to that of the Esquimaux breed, and of the wolves. The prevailing colors are black and gray, mixed with white. Some of them are entirely black. * * *"

He quotes from Theodato "Canada," written in 1630, to show that at that early period, and "perhaps even before the arrival of Europeans, they formed an esteemed article of food of the natives." Confirmatory of the theory of the Pre-columbian origin of the Indian dog, may be cited the following extract from Hakluyt's voyages regarding the Indian dogs seen on Cape Breton island, p. 1593:

"Here divers of our men went on land upon the very cape, where, at their arrival they found the spittes of Oke of the savages which had roasted meate a little before. And as they viewed the country they sawe divers beastes and foules, as blacke foxes, deere, otters, great foules with red legges, pengwyns, and certain others. * * * There-upon nine or tenne of his fellows running right up over

the bushes with great agilitie and swiftness came toward us with white staves in their hands like halfe pikes, and their dogges of colour black not so bigge as a greyhounde followed them at the heeles; but we retired into our boate without any hurt at all received." (The voyage of the ship called the *Marigold* of M. Hill of Redrise unto Cape Breton and beyond to the latitude of 44 degrees and an half, 1593, written by Richard Fisher Master Hilles man of Redriffe, Hakluyt, III, 239).

It is probably this variety, the bones of which have been found by Dr. J. Wyman, in the shell heaps of Casco Bay, Maine. The presence of the bones of the *dog* might be accounted for on the score of its being a domesticated animal, but the fact that they were not only found mingled with those of the edible kinds, but like them were broken up, suggests the probability of their having been used as food. We have not seen it mentioned, however, by any of the earlier writers, that such was the case along the coast, though it appears to have been otherwise with regard to some of the interior tribes, as the Hurons. With them game being scarce, "venison was a luxury found only at feasts, and dog flesh was in high esteem."* * * A whole left half of the lower jaw of a *wolf* was found at Mount Desert, measuring 7.5 inches in length, making a strong contrast in size, with a similar half from a dog found at Crouch's cave. This was more curved, and had a length of a little less than five inches (Amer. Nat. I, 576, Jan. 1868). It is possible that the Newfoundland dog was indigenous on that island, and also an offshoot of the gray wolf, allied to the Eskimo. In their "Newfoundland" Messrs. Hatton and Harvey say that there are few fine specimens of the world-renowned "Newfoundland dog" to be met with now on the island, from which it derives its name. "The origin of this fine breed is lost in obscurity. It is doubtful whether the aboriginees possessed the dog at all; and it is highly improbable that the Newfoundland dog is indigenous. Some happy crossing of breeds may have produced it here. The old settlers say that the ancient genuine breed consisted of a dog twenty-six inches high, with black ticked body, gray muzzle, and gray or white stockinged legs, with deer claws behind." Judicious treatment has greatly improved the breed. "Their color is white, with black patches, curly coats, noble heads and powerful frames. The favorite Newfoundland dog at present, is entirely black, of large size, from twenty-six to thirty inches in height, remarkable for his majestic appearance. It is now generally admitted that there are two distinct types of the Newfoundland dog, one considerably larger than the other, and reckoned as the true breed; the other being named the Labrador or St. John's, or Lesser Newfoundland. The latter is chiefly found in Labrador, and specimens are also to

be met with in Newfoundland," pp. 194-195.

Regarding the dogs of the Mexican Indians, Nadaillac says in his Prehistoric America: "The European dog, our faithful companion, also appears to have been a stranger to them. His place is very inadequately filled by the coyote, or prairie wolf, which they kept in captivity and had succeeded in taming to a certain extent."

In a recent visit to Mexico, not only along the railroads, but in the course of a stage ride of about five hundred miles, through provincial Mexico, from Saltillo to Don Miguel, we were struck by the resemblance of the dogs to the coyotes; there can be little doubt but they are the desendants of a race which sprang from the partly tamed coyote of the ancient Mexican Indians. At one village, Montezuma, we saw a hairless or Carib dog as we supposed it to be; similar dogs are sometimes seen in the United States.

Finally that the domestic dog and gray as well as the prairie wolf, will hybridize has been well established.*

DICKENS AND THACKERAY.

[From Knowledge, June, 1885.]

Mr. Thurlow Weed, the American politician, once expressed surprise at the circumstance that in England Dickens does not seem to be at present held in such high esteem as in America. He remarked that, to him, there seemed no comparison between Thackeray and Dickens, so far at least as their power of enchaining the attention was concerned. I propose to point out some considerations which appear to me to justify the opinion which is now generally entertained in England respecting Dickens' writings. It also should, however, be understood that those who recognize most clearly the shortcomings of Dickens even as a humor-

*Dr. Cones has observed hybrids between the coyote and domestic dog on the upper Missouri (see the American Naturalist. 1873, p. 385). To this we may add our own observations made at Fort Clagget on the Upper Missouri in June 1877. We then were much struck by the wolf-like appearance of the dogs about an encampment of Crow Indians, as well as the fort; they were of the size and color of the coyote, but less hairy and with a less bushy tail. They were much like those lately observed in Mexico, and I have never seen such dogs elsewhere. Their color was a whitish tawny, like that of the Eskimo dog.

Confirmatory of these observations is the following note by J. L. Wortman, in the report of the Geological Survey of Indiana for 1884: "During extended travel in Western U. S. my experience has been the same as that recorded by Dr. Cones. It is by no means uncommon to find mongrel dogs among many of the Western tribes, notably among Umatillas, Bannocks, Shoshones, Arrapahoes, Crows, Sioux, which to one familiar with the color, physiognomy and habits of the coyote, have every appearance of blood relationship, if not, in many cases, this animal itself in a state of semi-domestication. The free inter-breeding of these animals, with a perfectly fertile product, has been so often repeated to me by thoroughly reliable authorities and whose opportunities for observation were ample, that I feel perfectly willing to accept Dr. Cones statement."

To these statements may be added that of Milton P. Pierce. published in Forest and Stream for June 25, 1885, as follows: Hybrid wolves have always been very common along our Western frontier. I have seen several of them, sired both by dogs and wolves, and all I have seen have resembled wolves rather than dogs." It is to be hoped that our mammalogists may collect and examine this subject, particularly the skulls and skins of numerous specimens both of dogs and wolves and of the hybrids betweed them. Further observations are also needed as to the fertility of the hybrids.

ist (using this word in the wide sense in which Thackeray has employed it in his lectures on writers of the last century), feel too deeply the debt of gratitude the world owes to Dickens, to desire in any way to be-little a name which men will always hold in high esteem.

It may be convenient, though there are objections to such a course, to follow Mr. Thurlow Weed in making comparisons between Dickens and Thackeray. It will be noticed that though he says there is no comparison he, in that very remark, makes very definite comparison between the two writers. The practice of instituting such comparisons is not a pleasing one. We may praise, or, if occasion arise, blame, a writer, a painter, a sculptor or a man of science, without inquiring whether he deserves more or less praise or blame than some other worker in his own line. I have noted cases where comparisons, unnecessarily introduced into criticisms, seem as though specially intended, as certainly they are calculated, to excite ill-will between the persons compared; and it would be well if a system of criticism were adopted from which all such comparisons should be rigidly excluded as michievous and offensive. But in considering the work of two such writers as Dickens and Thackeray comparison can hardly be avoided, though often the study of their writings suggests rather contrast than comparison.

So far as the construction of their stories are concerned, neither Dickens nor Thackeray has shown special skill. But there is one marked difference between them in this respect: Thackeray deliberately rejected the old fashioned method of constructing a plot. His stories are pictures from real life, and were meant to be such. He no more attempts artistic arrangement than Hogarth aimed at color effects in his paintings. In fact, at times, when he finds his events moving towards an effective situation, Thackeray deliberately interrupts the current of his narrative to call attention to the opportunity thus offered for fine writing, of which, however, he refuses to avail himself. I could cite several instances, but will content myself by mentioning the scene where Philip Firmin breaks in upon a group of angry persons on Mme. Smolensk's staircase. "Here, I protest," he says, or to that effect —"here, I protest, is a fine situation," and he proceeds to sketch in the details; but in order rather to make a grotesque than an effective situation—though there are few passages more beautiful than the closing lines of that description.[1]

1. On this point Mr. Proctor differs from many competent critics. It has been generally supposed that Dickens took more liberties with the traditional form of English fiction than Thackeray. Without reference to the fact, remarked by M. Taine, that neither of these Masters ventured to shock public opinion by portraying the passion of love in an unconventional manner, it may be asserted confidently, that Thackeray's genius and education led him to accept the literary heritage left by preceding English novelists, much more fully than his great congener. It is true, as noted by one of his critics, that his novels have the misfortune of recalling those of Miss Edgeworth; and it is none the less true that De Foe and Swift sometimes more than whisper

With Dickens the case is altogether different. It is true that "Pickwick" was purposely written without any definite plot; but Dickens was then writing to order. In all his other stories he manifestly aimed at the construction of an attractive plot, after the old fashioned manner, the story to come to a close with the marriage of the hero and heroine, the good characters to get their proper reward, the villains to be duly punished.[2] He not only failed, but it is noteworthy that not one of his heroes or heroines, and scarcely one of his very good and very villainous characters is well painted. His heroes, indeed, are, for the most part, like that youth of the Chuzzlewit family, who had no outline, or rather they may be described as Mantalini described two of his imaginary conquests, of whom one "had no outline at all," and the other "had a demned outline." Clennam and Walter Gay are of the no outline sort; Nickleby, Harmon and Chuzzlewit belong to the other category.[3]

It is in fact in the presentation of character that the contrast between Thackeray and Dickens is most marked. It appears to me that Thackeray stands among the very first of our English writers in this respect, even if, so far as novel writing is concerned, he is not absolutely first. Macaulay would have set Jane Austen before Thackeray, because of the skill with which she delineated characters closely akin. But the range of Miss Austen's portraiture was so small compared with that of Thackeray's, that he must be set above her on this account alone, unless it could be shown that she would have been as successful on the large scale as she certainly was in the few cabinet pictures on which she excercised her powers.[4]

I am particularly struck by Thack-

from his pages. But, with all its beauties and faults, who has yet found in Dickens' style, or motive, the unmistakable signs of a literary heirship or serfdom. Even the very instance of Mr. Thackeray's self-denial, Mr. Proctor adduces, is purloined, so to speak, from an earlier writer.
W.

2. Mr. Thackeray's critics have said the same thing about him, and with perfect truth. Even in the only good novel, as a novel, that he wrote (Henry Esmond), there must needs be a happy marriage of the hero and heroine to close the account; though the heroine was several years the elder of the two. And it might be asked of Mr. Proctor, in what novel of Thackeray does the villain remain unpunished, the hero unrewarded. Col. Newcome don't count—it is a common trick with novelists, (as with the world at large), when their heroes ask for bread to give them a stone.
W.

3. Let us compare these characters of Dickens with some parallel characters of Thackeray. Set against Clennam and Gay (who, by the way, are only intended to take perfunctory parts) J. J. and Frank Castlewood; against Nickleby, Harmon and Chuzzlewit, set Clive Newcome, Warrington and George Osborne; is there such a marked superiority in Thackeray as Mr. Proctor's slighting reference would imply? It may be confessed, once for all, that Dickens discovered his characters in humble life; that his portrayal of "gentlemen" and "ladies" (God save the mark! if Thackeray's presentation of English gentility is correct) is not flattering to the "caste of Vere de Vere"; that the great crowd of familiar faces which peer from his pages are characterized too strongly in some direction or other, to be met with in real life; yet his creations are true to Art and, therefore, true to nature. If a painter should attempt to characterize Murder, would the figure depicted on the canvass be a commonplace man in blouse and pantaloons with a slung-shot in his hand? Dickens' mind was essentially poetic, essentially northern. The old English poets were nearer to him in inspiration than any writer since Elizabeth. His characters were embodiments of isolated vices, passions, propensities, weaknesses and virtues. As such they are presented to us; as such we remember them, and as such we apply them in thought and word to those around us. The wonder is that these characters, these abstractions, should be given such a human interest, such a plausable, flesh-and-blood appearance, that we can scarcely rid our minds of the idea that they actually lived.
W.

4. It is curious that Thackeray should be commended for the very virtue in which he is certainly most deficient. It is not in the portraiture of character that Thackeray is greatest: Jane

eray's skill in giving life and reality to his leading characters (we must not say heroes and heroines, since Thackeray tells us he knew of none, and pretended to describe none), because it is in this novelists chiefly fail. What a vague and shadowy set are Scott's heroes and most of his heroines, though it must be admitted that Rebecca, Di Vernon and Julia Mannering are charmingly delineated. On the contrary, Esmond, the two Virgianians, the other Warrington, Pendennis, Clive Newcome, Philip Firmin and dear old Dobbin—all these are men, not (like most of our story heroes) mere names tacked on to descriptions with which they do not in the least correspond.[5]

But even more striking, though less generally recognized, or in general denied altogether, is Thackeray's power of portraying women. I find it perfectly amazing that so many deny Thackeray's power in this respect, where he is almost without a rival. Repeatedly we hear it said that he could only draw two sorts of women —Becky Sharpes and Amelia Osbornes—apart, that is, from subordinate characters.

It is noteworthy that women hold this opinion; indeed, I am not sure that they are not responsible for the opinion that all Thackeray's amiable women are fools and all his clever women rogues. Yet no opinion could be much further from the truth. Theo and Hetty Lambert suffice as illustrations of Thackeray's power in delineating amiable women who are not fools and clever women who are not only not rogues, but of sweet and attractive dispositions.

In Ethel Newcome we have the two qualities combined in still more marked degree. Surely, by the way, there is no more charming picture than that of Ethel Newcome, infinitely more attractive, with all her faults than she would have been without them, and without her noble and touching repentance.

What strikes me most in Thackeray's portraiture of women is that even those among his female characters who belong to the same category are so clearly discriminated. Amelia Sheldon is an amiable non-

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Austen, or Miss Edgeworth, or Richardson could easily vanquish him in that field. Confessedly he limned his characters, such they were, with skill; but as they were all used as the stage setting for the effectual use of satire and irony and, occasionally, wit of even coarser texture; as lay figures to be dressed up as butts for ridicule; men of straw to be jibed at, kicked, pounded, pulverized amidst the hurrahs of the audience; there is nothing so very wonderful in his skill. I don't think it remarkable that a writer who could so brutally insult his female characters (characters, too, only bad from training) whenever they are brought upon the stage, should show a marvelous acquaintance with the side of English high-life depicted by him. W.

5. Whew! I should like to ask Mr. Proctor if he ever, in the whole course of his life, met one Esmond. As for the two Virginians, they are absurd as pictures of real life; they seem to me more like the pictures painted on old-fashioned dinner plates, where trees, houses, dogs and men are all of the same size and of very much the same appearance. Pendennis, the son of a country doctor, deeming himself of gentle blood through his mother, commences a career of intolerable snobbery by airing his gentility, and yet making a fool of himself over an ignorant actress whom he wishes to marry. Clive Newcome, a most improbable character in many respects, is thoroughly Thackeraynian in making an ass of himself by posing as a martyr before Ethel Newcome after marrying poor little Rosey. And, for Heaven's sake! what spot on earth holds another Philip Firmin? Is it possible that such boorishness and refinement, ignorance of the world and god-like sagacity, strength aad weakness, good sense and silliness are wedded in any real person. W.

entity, and so is Rosey Mackensie; but no one would ever mistake one for the other or either for Fannie Huxter. There is, in fact, no more resemblance between the two than there is between Rosey's fit of jealousy when Ethel Newcome brings the news of the letter found in Orme's History and Amelia's jealous love for that young pickle, her son. Again, Laura Pendennis and Charlotte Bayham are both amiable girls, both bright and intelligent, though neither is particularly clever, but they are no more to be mistaken for each other than Captain Costigan for General Bayham or for Colonel Newcome.

So with the unamiable ladies. Apart from the difference between the social condition of Becky Sharp, Blanche Amory and Fannie Mountain, they are perfectly distinct in character, though all are clever and unscrupulous, all seductive rather than attractive. Unlike these in nearly all respects, though belonging to the same category, is Beatrice Castlewood, just as Lady Castlewood is unlike all Thackeray's other amiable women (nearest, perhaps, to Helen Pendennis) and Clara Pulleyn unlike all those of the class to which she belongs.

The development of Mrs. Mc Kensie's character from mere vulgarity to viragoism is worked out with surpassing skill. As other illustrations of Thackeray's skill in this direction I would mention the ladies of the Castlewood family and the two daughters of Sir Miles Carrington.

Thackeray seems to have taken keen delight in picturing good mothers. By the way he was a great admirer of Steerforth's mother, in "David Copperfield," the only lady in Dickens' novels.[6] A writer in the *Atlantic Monthly* a few years since said of Thackeray that he had given us scarcely any mother-characters; the *Atlantic* writer admitted, indeed, that Thackeray had given some good mothers but, oddly enough, wrote as though two good mothers were neutralized by one bad one. I fancy I could name a score at least of mothers in Thackeray's novels without considering those in the "Snob Papers," "The Hoggarty Diamond," "The Bedford Row Conspiracy," "Our Street," etc., the wonderful mothers in "The Raven's wing," and "Barry Lyndon," or the sketches in "Denis Duval."

In "Vanity Fair" we have at least five mothers—Amelia Osborne, Mrs. Sedley, Lady Southdown, Mrs. Bute Crawley. and Mrs. Becky Crawley (*nee* Sharp) herself—to count only those who are depicted as mothers, good, bad, or indifferent. Mrs. Major O'Dowd views her military family in so motherly a way that she

6. This is a queer assertion, but there is no doubt that Steerforth's lady-mother was more to the mind of Thackeray than any of the mere women portrayed by Dickens. It is sometimes startling, from an American stand-point, to discover an English definition or characterization of what constitutes a lady. Of course Proctor means that Mrs. Steerforth is the only aristocratic woman portrayed by Dickens; but he certainly forgets Mrs. Skewton and her daughter, Mrs. Dombey, Lady Dedlock and Emma Haredale. W.

might almost be counted among Thackeray's mothers. In "Pendennis" we have four mothers; Helen Pendennis, the Begum, Harry Foker's "mum," and Fanny's foolish mother—not to count the mother of Mdle. Caracole, or whatever the lady's name who adorned Foker's Richmond party. In "Esmond" there is only one "full length" mother—Lady Castlewood, (a singularly skillful drawing, by the way, if the difficulty of the subject is considered); but in its sequel—"The Virginians"—there are at least six admirably discriminated pictures of mothers—Rachael Warrington, Mrs. Mountain, Lady Castlewood the second, Mrs. Lambert. Mrs. George Warrington (*nee* Lambert) and Lady Warrington. In the "Newcomes" mothers are still more numerous. There are no less than eight—Lady Newcome, Mrs. Hobson Newcome, Leonore de Florac, Laura Pendennis, Mrs. Mc Kenzie, Barnes Newcome's unhappy wife, Lady Walham and Lord Farintosh's mother (remarkable as having been resuscitated by Thackeray, who had killed her and forgotten all about it). In the "Adventures of Philip" (with the "Shabby Genteel Story") there are six mothers—Mrs. Gann, dear Caroline Brandon (Philip is her own child we know) Mrs. Brandon Firmin, Mrs. Philip Firmin, Mrs. General Bayham and Philip's first threatened mother-in-law, Mrs. Twysden—all admirably sketched, though some with only a few masterly strokes. In "Lovel the Widower," there are three mothers, all taking active parts in that wonderful scene which follows Lovel's declaration. In all no less than thirty-three admirably delineated mothers (doubtless I have overlooked several) by the writer, of whom it has been absurdly said that he could never draw a woman.

But while Thackeray's success in delineating characters ordinarily met with in the world must be admitted by all who give the matter a thought, there are many who deny to Thackeray the power which Dickens is regarded as possessing in a very eminent degree—that, namely, of delineating such strange and whimsical characters as are less frequently met with.

Probably, if Thackeray had allowed himself the same license as Dickens in such matters, he would have been as successful in presenting in an amusing manner the grotesque, the fanciful, and the weird. The license I mean is that of combining in the same character incogruous characteristics.

This license, indeed, Dickens took with characters of all orders; and not only so, but he took the further license of distributing among different characters the peculiarities of one and the same person whom he knew in real life. For instance, we know that some of the peculiarities of Micawber were copied from what Dickens had seen in his own father, while others were taken from other originals. So Mrs. Micawber has

many ways which Dickens had noted in his own mother, while others of her peculiarities were not such as characterized Mrs. John Dickens. But we find also that while the oddities of Micawber and his wife were borrowed from different sources, so the characteristics of Dicken's father and mother were distributed among different characters—Mr. and Mrs. Nickleby, Mr. and Mrs. Micawber, and so forth.

One of the most remarkable illustrations of Dicken's manner in such matters, a manner unquestionably resulting from deficiency of the creative faculty (which, until the real origin of many of his characters had come to be known, was mistakenly supposed by inexperienced readers to be possessed by Dickens in a large degree), is to be found in Dora and Flora. Copperfield's first meeting with Dora is Dicken's meeting (when little more than a boy) with a lady by no means so young as Dora is there represented. The courtship is derived from his youthful love for the original Flora. The married life of Dora, so far as her household ways are concerned, presents Dickens' own experience, so that Dora there represents a third person, and that person his wife. And lastly the death of Dora, and Copperfield's sorrow during the following years, are drawn from the death of his wife's youngest sister, Mary, and the sorrow of Dickens felt for years thereafter. Yet, though the real Flora furnished only one of these four copies from which the Dora of fiction was combined, we find her forming part of two distinct and very unlike characters, the characteristics of her latter years being in part reproduced in Flora—but only in part, for some of Dora's ways were derived from other sources.

Nor can it be said that, after all, Dickens so artisticcally combines and distributes what he had observed, that they become effective as if they were real creations. For no one possessing any power of critical discrimination can have failed to recognize the incongrulty of many—one may almost say of all—of Dickens' characters long before it became known that he had constructed them of heterogeneous materials and applied his materials to heterogeneous purposes.

Another remarkable illustration of Dickens' manner of writing, is to be found in a picture which is commonly, and in some respects justly, admired—the childhood and death of little Paul Dombey; yet the ways of the old-fashioned child, a child with whom Dickens had been exceptionally well acquainted (himself), while the latter scenes were, it is needless to say, taken from a different experience.

And here I feel tempted to remark on a peculiarity of Dickens' manner of treating his subjects which would of itself show that he did not belong to that class of creative writers which includes all the really great names of literature.

Paul Richter used to say "If an author has to stop and ask himself, 'what shall I make such and such a character, do or say at such and such a point in the narrative?' to the devil with him," implying that such an author may possess superficial cleverness, but no genius. I wonder what Richter would have said of an author who not only thus hesitated, as we find Dickens repeatedly did, but asked and took the advice of his friends about so critical a question as the fate of his principal characters, or even after writing the closing chapter of a story adopted, at a friend's suggestion, an entirely different conclusion?[7]

No one knew better than Dickens the requirements of true art. Nay, he often describes himself as living in his work and among the characters of his story, as the true artist should live; but it is certain he deceived himself, for if he had he could never have been in doubt what their fate was to be, and still less could he have modified, at the suggestion of those who were comparatively strangers to his creations, the fate which he had decided should be theirs.

I am aware that other novelists have on occasion done likewise. Scott, for instance, consented to restore Athelstane of Coningsby to life after he had killed him, and a fine mess Scott made of that change; but, even if we assigned to Scott the high position assigned him by contemporaries, it might still be answered that Athelstane was only a subordinate figure in the story, and that Scott would never have consented so to arrange matters to suit the popular taste—that the insipid Rowena should have disappeared and the gallant but shadowy Ivanhoe have married Rebecca, that most beautiful of Scott's creations.

It need hardly be said that Thackeray does not allow himself such license as Dickens in the portraiture of character. Not a line can be found in the pictures of Costigan, Huxter, Rawdon Crawley, Lord Steyne, and the host of varied characters which appear in Thackeray's pricipal works, which can be regarded as incongruous nor can I recall a single instance in which characteristics appropriate to one character are distributed among several. Again Thackeray never, so far as can be judged, departs from that natural sequence of events which the development of his stories has suggested to him.

Thackeray was content, in fact, to hold the mirror up to nature. I do not say that the portraiture was always perfect, still less that the work belongs always to the highest class. George Eliot seems to me to be as far in advance of Thackeray in many respects, as Browning is in advance

7. There is so much downright rot and pure assumption in these criticisms of Mr. Proctor, that it is not worth while to answer him; but the dictum of Richter, as Proctor must have known, did not apply to the case presented by him. If it is a literary sin to ask advice of friends, or to build up a character from heterogenous materials, we must bid farewell to Shakespeare, to Goldsmith, to Tennyson, to George Eliott, to Thackeray himself, for they are certainly damned. W.

of Tennyson. (For this reason, she will always be less popular than Thackeray, even as Thackeray is less popular than Dickens). But the work Thackeray undertakes is always good work, and it is always well done. He does not seek to please by effective situations, by bringing in *per fas et nefas* humorous or pathetic images, though his humour is true, his pathos deep and touching. Nor does he care to make his stories "end well" or even end at all?[8] They are slices from real life, and real life moves ever onward. His pictures, if not the finest, are among the best drawn of all that English writers have given us.

I have already said much more than I intended when I began, yet I seem scarcely to have done more than touch upon my subject, so many considerations have I been obliged to omit which I had had in my thoughts. But there is one point which I must touch upon, though briefly, viz:, the quality of the language in which Thackeray and Dickens have expressed their conceptions. Here as it seems to me, the two writers hold a nearly equal position. Thackeray, it is true, wrote more accurately, at any rate in his latter works (for there is some very questionable English in his earlier writings). Dickens, indeed, repeatedly uses words in a wrong sense, and not unfrequently offends against the rules of grammar. He makes his worst mistakes when he aims either at fine or precise writing. Of the former we have a remarkable instance in a passage which Forster quotes with high approval, where Dickens speaks of a man being "an atheist in all the better feelings of our nature." Of the latter the most striking illustration which occurs to me at the moment is the passage where he says of Eugene and Bradly Headstone that "no matter who spoke or whom was addressed" they continued to watch each other. But despite mistakes such as these there is a singular charm about Dickens' English. The charm resides partly in its clearness, partly in liveliness of imagery, but chiefly I believe, in its perfect music. In order to appreciate Dickens' English fully, let some of the descriptions in his "Uncommercial Traveller" be compared with writers on similar matters, even by the ablest authors of the age. Of Dickens, indeed, we may say—though probably he himself would not have been disposed to admit as much—that "description was his forte."

Of the two writers Thackeray occupies far the higher position. His true place is daily becoming more clearly recognized. It will, I believe, be generally admitted before long that Charlotte Bronte' was not far from the truth, when she wrote (as nearly as I can recall the passage) that he was the foreman of that working body which sought to restore the

8. This is astounding! I cannot recall an instance where Thackeray did not draw his novel to a close in the most approved and hacknied method, including the distribution of all necessary rewards, retributions, etc., etc. W.

warped order of things to rectitude. As she said, his wit is keen, his humour light, but they are no more by comparison with his serious power than the sheet lightning of the summer cloud compared with the scathing flash which leaps from its dark bosom?[9]

9. It has grown to be a superstition with a certain class of writers, that in any comparison between Dickens and Thackeray the former must suffer and that, in fact, the superiority of the latter is so apparent that a certain amount of patronizing praise is necessary in the garish light of Thackeray's genius, to prevent the total eclipse of Dickens' fame. There is a strange fatality apparent in the contemporary fame of great men. What laughter would have pealed from clerkly throats in the time of good Queen Bess, if some parvenu in literature had suggested that the plays composed by an humble actor, one Will Shakespeare, were more worthy of fame than those of Ben Jonson; and would not the literateurs of the time of King George the Third, have enjoyed the verdancy of one who asserted that Oliver Goldsmith would exert a more powerful and more enduring influence on letters than Dr. Samuel Johnson. So it was and so it is with Dickens.

The novel of Thackeray was a product of the times. It sprang from a condition of society, of thought, of taste, necessarily ephemeral. It pictured a phase of English life, narrow, insular, selfish, egotistical, which can only be interesting or useful to the people and the generation which gave it birth. It is a picture of manners, a book of etiquette, a chronicle of post-prandial bon mots, a manual for diners-out and literary snobs; in a word, it is a book for the time and not for all time. On the other hand the novel of Dickens is a picture of human life. Wherever, under the bending skies, the human race lives and moves and has its being, whether in the palaces and huts of the Orient, or the mansions and hovels of the West, in princely halls or Tartar tents, it has in Dickens a chronicler of its smiles and its tears, its beauty and its ugliness, its sublimity and its degradation. The men and women, youths and maidens and children we meet, in his pages, and how familiar they are to us, how inseperable from the real people in our experience) are English in dress and speech alone. We have no gaudy Pendennises, no theatrical Clive Newcomes, no boorish Philip Firmins (look them up pray, good reader, if you have not met them) among our circle of friends; but, thank Heaven? there are Nicklebys, Copperfields, Martin Chuzzlewits, aye, and breezy, hearty, wholesome, Walters too. Ah, how they troop into remembrance, those citizens of the world—those "abstracts and brief chronicles" of human nature,—with the whole Pickwick Club as marshals of the day! Dear old friends, their creator has left to them the task of perpetuating his fame, and not to scribblers and penny-a-liners. Taine's words, in drawing a parallel between Balzac and Thackeray, may be paraphased as follows with perfect truth and justice: "When we have read to the end of Dicken's novels, we feel the pleasure of a naturalist walking through a museum, past a fine collection of specimens and monstrosities. When we have read to the end of Thackeray, we feel the shudder of a stranger brought before a mattress in the operating room of a hospital, on the day when cautery is applied or a limb is taken off." W.

EDITORIAL.

THE NEW STAR.

E. W. Maunder discussing the "New Star in the Great Andromeda, in the Observatory for October, says: It is premature, no doubt, to attempt to draw any very definite deductions from the present outburst; but it should always be clearly borne in mind that these "temporary" stars—and that this star may properly be classed as such is evident, for it is already fading—cannot be stars in the least resembling our own sun in size or structure. Could the radiations of the sun be suddenly increased a thousand fold, it would be absolutely impossible for it to resume its former scale of brightness within the course of a few weeks or months. The suddenness of the increase and sudden decrease of light, prove unmistakably that we have to do with bodies relatively minute, and therefore capable of rapid cooling. The only alternative—that the star has not really altered its lustre, but that some intervening screen has been temporarily withdrawn—seems inadmissable, especially in view of the spectroscope history of *T. Coronæ* and *Nova Syni.* Since, then, the distance of these stars is so great (for as yet an appreciable parallax has not been obtained for any one of them) and their brilliancy so high, we are compelled to substitute for a compact sun a loosely scattered, widely extending system of small bodies—a system similar in character. but on an indefinitely larger scale, to that which we see in the corona or in the rings of Saturn.

Another writer in the same magazine suggests that outbursts like that in Andromeda might be caused by some celestial body coming in contact with a gaseous Nebula, causing its light to be greatly intensified.

THE TAENSA LANGUAGE.

The controversy between Dr. Brinton and M. Adam arising out of the latter's book on the Taensa grammar and literature, does not seem to have been terminated by the reply of M. Adam to Dr. Brinton's criticism. In the October *Antiquarian*, Dr. Brinton returns to the attack without abating his personal distrust of the genuineness of the Taensa grammar and texts, as fathered by the French *Americaniste*, and alleges that Adam has retreated so far from his original position as to leave nothing in dispute but the authenticity of the grammar. As to this point the celebrated philologist, Friedrich Muller, says (translation) "I think, therefore, that the Taensa Grammar, in general, is genuine; that one can use it as the material to form a judgment of grammatcal structures; but it is better to avoid using this material so long as the original manuscript shall not be produced." At the conclusion of his reply, M. Adam avers that "*la France n'est point la terre classique de l'imposture et du* humbug"; to which Dr. Brinton makes the pertinent response that the only other kindred imposture

to the one which Perisot is accused of, was perpetrated by a native of "la France"—George Psalmanasar.

THE AMERICAN ANTIQUARIAN.

One evidence of the continued prosperity of this valuable magazine, is given in the fact that it is absorbing various amateur journals, and surviving all competitors in the same department. The editor announces in the September number that the *Museum*, a monthly recently established in Philadelphia, has been merged into the *Antiquarian*, and that all of the contributions, correspondence, engravings and subscription list have been already transferred. A new department called the "Museum," devoted to the description of archæological relics has however been established, and Mr. E. A. Barber, the editor of the *Museum*, is to have charge of it.

Archæology is now the rising science, and it is a cause for congratulation that a magazine which is as safe and careful, and at the same time as progressive and scholarly as the *Antiquarian*, should be able to hold the field, and unite the workers of all classes.

TUBERCULOSIS IN CATTLE.

In a paper read before the Newport Natural History Society, Mr. J. M. Heard, a veterinary surgeon of repute, assserts that the *bacillus tuberculosis* of man is the same as that of bovines. He says that under artificial cultivation the bovine *bacillus* behaves the same as the human *bacillus tuberculosis*, and that cattle inoculated with the sputa of human tuberculous patients become tuberculous. The milk from tuberculous cows does not produce tuberculosis unless the udder is the seat of the disease. In that case, many instances show the danger of using the milk. An article in the October *Journal of Comparative Medicine and Surgery* (where also Mr. Beard's paper may be found) urges the necessity of a sanitary inspection of our milk supply, with a view to eradicating the danger, among others, of infecting children and milk-drinkers with bovine *bacillus* of *tuberculosis*.

ANTIQUITY OF MAN IN AMERICA.

Von Koseritz has just published a series of Anthropological essays, based upon his investigations in Brazil. His conclusions are, that the early American races were equally as ancient as the River Drift men of the old world, and that they were not the same type as modern Brazillian nations.

In *Science* for October 9, there is an extremely interesting paper on "Racial Characteristics of Jews," illustrated with portraits of five Jewish boys, and a composite made from them. It is curious to note the apparent wide difference in the features of the several faces represented, and observe the result in the composite. This shows a noble and beautiful face with the race-characteristics shaded, yet prominent. It resembles faces from the sculptures of Ninevah and Babylon.

Some time since a startling paragraph was current in the papers about a new telephone, invented by a Texan of the name of Brown. It was said that his invention would revolutionize telephony, and that he had sold an in-

terest to eastern capitalists for $1,000,000. It turns out, however, that the only patent thus far issued to the Texas genius, is for a new form of key, combined with the use of a Bell Telephone, in lieu of an ordinary telegraph sounder.

THE sixth volume of Dr. Brinton's Library of Aboriginal Literature is now in press. It is the annals of the Cakchiquels, and will be printed in the peculiar alphabet of the tongue. The annals were written about 1560, by a native of Guatamala.

A FLOATING dome was recently presented to the observatory at Nice. Instead of being mounted on rollers, this dome will rest on a reservoir of water. It is claimed that the suspension is so delicate that a single person can turn it round the horizon.

SAN FRANCISCO has good cause to discredit the wide-spread doctrine that wealth is inherently selfish and conservative. Already possessing one of the most remarkable libraries in the world, through the munificence of Mr. H. H. Bancroft, she will shortly boast another as the gift of another wealthy citizen, a Mr. Sutro.

SCIENTIFIC AND INDUSTRIAL NOTES.

A MATHEMATICAL THEORY OF EVOLUTION.

The following is the kernel of Mr. Cave Thomas' lecture on "The Bases of a Science of Æsthetics," which has not only an immediate bearing on the subject treated, but on the entire aspect of scientific thought. In reply to the question, "What were the bases of a science of æsthetics?" he said: "His audience were perhaps aware that philosophically it was a well-recognised fact that we know nothing of the external world absolutely per se, but only phenomenally, or as it appears to us in sense. We had, therefore, to ask ourselves whether there be any common and fundamental characteristic of those phenomena.

Speaking more immediately with reference to the sense of sight, the knowledge of external existence comes to us by means of the telegraphy of vibrations, which impresses miniature images on the retina. We never even "see things," as we express ourselves in their actual, but only in their relative proportions; and when we come to analyze the different kinds of impressions on the sense of sight, we find that they are manifested in the three fundamental modes of consciousness—viz:, in space, in time, and in force; and the important truth to be deduced from this, is that these three modes are alike quantifiable, that is to say, the terms more, less, equal, etc., were producible of the the three modes; differences in the sensations of light, colour, are therefore fundamentally quantitive, or proportional differences, differences in light and shade are also fundamentally quantitive, or proportional differences, and so also are differences in the configuration and superfices of visible images. It may be perceived, then, that the form of all visual phenomena, is quantitive. Hence the conclusion that all the relations of phenomena, recognized by the sense of sight, whether pleasing or displeasing, are fundamentally proportional relations and the science of æsthetics, a science of definite proportional relation—that is to say, the beautiful in form, in colour and in light and shades, consist in those definite proportional relations which are opposite to the sense of sight, to the eye, and these it is the aim of a science of æsthet-

ics to formulate. The lecturer, however, has not limited his investigation to the sense of sight; he has analyzed the phenomena of the other senses, and has been led to make the following important generalization, which he believes will affect the whole future current of human thought, viz: that the form of phenomena, of experience, of knowledge, is quantitive. If this be a correct generalization, then adaptation to purpose, fitness, resolves itself into adaptation of proposition to purpose; evolution development, into the becoming of the proportioned in all things; politics into the proportional adjustment of material interests, and of social relations; ethics into the science of proportioned conduct; hygiene into the science of proportioned living; education into the science of training and developing a proportioned or beautiful race; æsthetics into the science of proportioned taste; and fine art into proportioned art. Mr. Thomas has completed a work treating all the above subjects fully on this mathematical basis.—Knowledge, June 5, 1885.

PHOSPHORESCENCE.

Near to my house there is an avenue of lime-trees, the growth of which is so luxuriant that the foliage almost shuts out the direct rays of light, and in this avenue, at half-past ten last night, I noticed a phenomenon that you may esteem worthy of chronicling.

The directlon of my walk was northerly, and I noticed that the leaves, and the air in their vicinity, were suffused with a soft, faint, phosphorescent light. This for a time I attributed to the vapour from the wet leaves being illuminated by the the moonlit clouds at my back, but, to settle my doubts, I examined a dense mass of tress from their shady shide, and found she light still distinctly visible, but, I think, not attributed to the moon. I believe some flowers are said to emit light. Are trees known to possess this power, and have the causes been unravelled ?—A. D. Barnes, in Knowledge, June 19, 1885.

A MODERN MOUND BUILDER.

I herewith send you the following description of a mound, opened by one of the Bureau Assistants on the Bluff back of Dunleith, Illinois.

This mound is conical in form, very symmetrical, sixty-five feet in diameter at the base, and ten feet high. It was found to contain a rectangular vault, thirteen feet long and seven feet wide, (inside measurement). The surrounding wall, three feet high and of uneven thickness, was rudely built of stone. Three feet from each end was a cross wall or partition of like character, thus forming a main central chamber about seven feet square, and a narrow chamber or cell at each end something over two feet wide and seven feet long.

The whole vault had been covered over with a layer of logs extending across the width of the vault, and their ends reaching slightly beyond the side walls.

In the central chamber were found eleven skeletons, six of them adults, and four children of different sizes, and one infant in the arms of one of the adults, probably its mother. They had all apparently, been interred at one time, and arranged in a circle in a squatting or sitting posture, against the walls.

In the centre of the space, around which they were grouped, was a fine large shell of Pyrula perversa, which had been converted into a drinking cup by removing the Columella. There were also numerous fragments of pottery.

The end cells, walled up as heretofore stated, were filled with a very fine chocolate colored dust, which gave out such a sickening odor when first uncovered, that the workmen were compelled to stop work until it had evaporated.

The covering was chiefly of oak logs, nearly all of which had been peeled, and some of the larger ones had been somewhat squared by slabbing off the sides, and the slabs and bark thus removed, together with the small brush, had been laid over them.

Over the whole vault, thus covered, had been spread layer after layer containing lime, each succeeding layer thicker and

harder than that below it. Over this was a foot or more of soil.—Cyrus Thomas, in American Antiquarian.

THE FUEGIANS.

The average height of twenty men of the Tekeenika of Yaghan race, from Orange bay, was found by M. Hyades to be 1.576 meters, that of twenty females 1.478 meters, a difference of nearly ten centimeters in favor of men. The tallest man reached 1.660 meters, and the tallest woman 1.577 meters. Although the inhabitants of this district are few in number, the size of the families seems to show that they are not diminishing. The Yaghans of the Beagle river number some 800, and have for neighbors, at the extremity of Beagle strait, the race of the Ona, living in the mainland of Terra del Fuego. This race is friendly with the Tekeenika, but those who were seen fled the presence of the white man. The Ona are, says M. Hohn, as tall as, or taller than the Patagonians. Five entire bodies (preserved in alcohol) are in the collection brought to Paris by Romanche. These are publicly exhibited by casts, and a hundred casts taken from life, representing every part of the body of individuals of both sexes and all ages, are either exposed publicly, or retained as a special collection open only to naturalists and physicians. Numerous photographs taken from every point of view, some of them representing the natives engaged in the various occupations of their simple life, add value to the collection. Every female of two years of age and upwards wears the machakana, a small triangular piece of guanaco skin, fastened around the haunches with a plaited band of whale-bone fibers. Every Fuegian carries also a mantle, which is but a simple skin of otter, seal or guanaco, imperfectly serving as a protection from cold. Bracelets, necklaces of shell, etc., are also worn by the women; and the men often wear a band of feathers or down, usually of Bernicla anartica. The only cutting instrument of the Fuegians is a knife of the Mytilus shell fastened to a stone handle with shreds of sealskin. The fishing lines, made of the stems of macrocistis pyrifera, or of whale-bone fibers, end in a running knot furnished with a hook made from a feather. Fire is obtained by striking together two pieces of pyrites, and with the spark enkindling a mixture of the down of birds and fine scrapings from Berberis or Drimys. These scrapings are used also as sponges or napkins.—Amer. Nat., September, 1885.

USE OF SPINES IN CACTUSES.

Our brethren across the water, assuming that thorns are simply for protection in a military sense, are exercising themselves in their serials over the spiny leaves of the holly. When young and vigorous, i. e., in early life, the teeth are very spiny; when the tree is aged, and the branches then a distance above the surface of the ground, losing the vigor, the spines are weak or absent. Sir John Lubbock and others, following the poet Southey, see in this a beautiful adaptation for protective purposes. When within the reach of animals, spines are borne; when high up where animals cannot reach, spines are unnecessary. Numbers of species of plants have mucronate points to the leafy serrature, which are wanted in maturer years. It is at any rate difficult to imagine why a sharp point should be made especially for protection, and points less sharp for no protective use at all.

I have often reflected on a fact referred to by Dr. Newberry, that our thorniest plants are in much greater proportion in places where animal life is scarce, and the immense police force sustained by the great vegetable community absolutely thrown away. Cactuses and other thorny things I have seen covered with thorns and spines on deserts where the hot air seemed to be bounding up and down like the surging ocean, and where not even a lizard could have dared to show its face. Thorns cannot be, so I have thought, for protection where the climate gives all the protection desired. I am not one who doubts that nature has a purpose in every move she makes, but the main purposes I think we seldom reach, and that we do ourselves an injury in research by assuming mere inci-

dental uses as the main purposes for which structures seem to be "adapted."

One of these uses in the spines of cactus has occurred to me. They break the full force of the sun on the plant, a force it is made to endure and not to love, as we know who have learned to cultivate it. Plant lovers set out their treasures in summer under "arbors" of fish netting or galvanized wire, and those who have no experience would be surprised to find how the moving shadows of the twine or wire lower the temperature. A mass of spines on a cactus must have the same effect. A cactus does not need much light on its epiderm to keep healthy. On the dry mesas along the Uncompahgre River I have seen some aggregated masses of Echinocactus phœniceus forming dense hemispheres a foot high and as much wide, with spines so thoroughly interlaced with spines as to rival the hedgehog, and leaving not a particle of the green surface visible; and there are species not cæspitose, such as E. pectinatus, which no one can see for spines without cutting apart, and forming a complete protection from the hot suns under which they are doomed to live.

I do not suppose I have yet reached the final purpose of spines in a cactus any more than we have the final purpose in the existence of the cactus itself, but that one use of cactus spines is to furnish a partial shade I feel to be beyond a doubt.—Thomas Meehan in Bull. Torrey Botanical Club.

WEATHER REPORT FOR OCTOBER.

Prof. Snow furnishes the following October weather report:

With one exception (1869) this was the coldest October on our eighteen years record. It was the fourth successive month with rainfall above the average. The cloudiness, wind velocity, and atmospheric pressure were all below the average. The first white frost of the season occurred on the 4th, three days later than the average date; and the first black frost followed on the 6th, thirteen days earlier than the average date.

MEAN TEMPERATURE—51.22°, which is 3.55° below the October mean. The highest temperature was 77° on the 16th; the lowest was 29° on the 6th, giving a range of 48°. Mean temperature at 7 a. m., 43.39°; at 2 p. m., 62.57°; at 9 p. m.; 49.45°.

RAINFALL—3.32 inches, which is 0.43 inches above the October mean. Rain fell on 7 days. There were 2 thunder showers. The entire rainfall for the 10 months of 1885 now completed, has been 34.27 inches, which is 2.69 inches above the average for the same months in the preceding 17 years.

MEAN CLOUDINESS—38.92 per cent of the sky, the month being 1.69 per cent. clearer than usual. Number of clear days (less than one-third cloudy) 16; half-clear (from one to two-thirds cloudy) 8; cloudy (more than two-thirds) 7. There were nine entirely clear days and three entirely cloudy. Mean cloudiness at 7 a. m., 44.84 per cent.; at 2 p. m., 41.29 per cent.; at 9 p. m., 30.64 per cent.

WIND—N., 22 times; N. W., 17 times; S., 14 times; S. W., 12 times; S. E., 10 times; N. E., 9 times: W., 5 times; E., 4 times. The total run of the wind was 9,350 miles, which is 2,442 miles below the October mean. This gives a mean daily velocity of 301.61 miles, and a mean hourly velocity of 12.56 miles. The highest velocity was 55 miles an hour, from the north, on the 28th.

BAROMETER—Mean for the month, 29.089 inches; at 7 a. m., 29.108 inches; at 2 p. m., 29.087 inches; at 9 p. m., 29.031 inches; maximum, 29.416 inches, on the 8th; minimum, 28 795 inches, on the 15th; monthly range, 0.621 inch.

RELATIVE HUMIDITY—Mean for the month, 70.1; at 7 a. m., 85.1; at 2 p. m., 48.9; at 9 p. m., 76.3; greatest, 100, on 12th and 18th; least, 27, on the 3d. There were three fogs.

ST. LOUIS OBSERVATORY.

The new observatory at Washington University is about completed, and bids fair to be one of the most perfect in the country. The earth upon which it is built at the corner of Eighteenth and St. Charles streets, is of a peculiar stiff clay, which allows very slight transmission of vibration, and conse-

quently the observations will not be appreciably interrupted by the jarring of the building from external influences. Prof. Pritchet, who has charge of the astronomical department, is making preparations which, when completed, will insure a most instructive and interesting year's work. Through the generosity of a few public spirited citizens he has been enabled to contract for a new telescope and clock, which were much needed, and the character of which will place this institution among the first in the country. The object glass of the telescope is six and a half inches, and was made by Alvin Clark, of Cambridge, and the focal length is to be eleven feet. This instrument when complete will have sufficient power to discover a body as small as the custom house in this city on the surface of the moon, and with this Prof. Pritchet purposes to operate during the fall and winter in his exchange of signals with the observatory at the City of Mexico, It is also proposed to enter upon a course of observations to determine the truth or falsity of the nebular theory or system, which has become an interesting question of late, owing to the discovery of one first magnitude star and a smaller star in one of the heretofore unoccupied spaces. The cost of this telescope will be nearly $2,500.—St. Louis Globe Democrat.

EXPERIMENTS WITH A NEW EXPLOSIVE.

Experiments with nitro-glycerine and other explosives have just been concluded by the School of Gunnery at the new ranges at Lydd, England. They have been chiefly directed to ascertaining the effects of shell fire where the shells have been charged with high explosives. Some remarkable results have been achieved.—Tests have also been made with a highly explosive material manufactured by a German maker. The material is composed of two ingredients, one of which is nitric acid. This is placed separately in glass bottles, which are put into the shell. In this condition, they can be handled with impunity by the operators. The explosion is caused after the shell has been fired by means of a detonater, the two substances mixing when the bottles are broken by the concussion. The result of the explosion of these two substances is described as far more terrible than that of nitro-glycerine. During the experiments with nitro-glycerine, one of the howitzers burst, and the breech of the gun was completely shattered. The gun was fired by electricity, and those engaged in the operations were fortunately under cover.

IMMORTALITY OF UNICELLULAR ORGANISMS.

Professor A. Weismann (Biolog. Centralblatt., iv., pp. 577-591, and 650-655) believes that the idea of a senescence of unicellular animals is not tenable.

Physiologically speaking, there is a profound difference between the uni-and multicellular organisms in the fact that the latter only wear themselves out by living, and proceed to a natural death. The unicellular animals are never so modified by the transformation of matter that life becomes impossible. They have no physiological death; their bodies are immortal.

GRANO-METALLIC STONE.

Under this name, a new material for footpaths and roadways is in course of introduction. It is composed of certain proportions of blast-furnace slag and granite, which are crushed, chemically treated, dried, and mixed with Portland cement. For use, these ingredients are formed into a paste with an alkaline solution, and laid on a substratum of rough ballast, a smooth surface being imparted at the finish. This artificial stone is laid with facility and sets rapidly, being ready for passenger traffic in ordinary weather in about twelve hours. It is fire-proof as well as water-proof, and one of its important features is, that it is not slippery on the surface—a circumstance that is due to the particles of hard vitreous slag always presenting themselves just beyond the other ingredients, which yield more readily to wear. Judging from a sample length of this stone laid down in the

Strand in front of the Gayety Theater, it promises well as a cheap and durable paving. It is the invention of Mr. J. H. Bryant, No. 45 Palace Chambers, Westminister, London, and has been adopted by several of the leading railroad companies, besides which, contracts have been executed in some of the suburban parishes and provincial towns.

THE PHILOSOPHY OF FLAME.

In the study of furnaces, F. Siemens says that large ones must replace small ones. He claims to have proven that solid substances interfere with the formation of flame, and that flame injures solid substances with which it comes in contact. To account for the phenomena he advances, preferably, an electric hypothesis. Accordingly he explains flame as the result af an infinite number of exceedingly minute electrical flashes, the flashes being due to the very swift motion of gaseous particles, and a solid body which opposes itself to these flashes is cut by them, while the motion being more or less arrested by the solid body, the flame is dampened. Mr. Siemens insists, therefore, that flame must not be allowed to impinge on bodies to be heated, but must simply heat the bodies by radiation, and furnaces must be so constructed as to allow the flame to develop out of contact, not only with the substance on its bed but with the walls and roof of the furnace itself.

A REMARKABLE MAN.

According to the Cincinnati Enquirer there resides about four miles east Owingsville, Ky., a man who is indeed a prodigy. The name of this wonderful man is Reuben Fields, and he has but one developed faculty, this one seeming to take entire possession of him, driving all other thoughts from his mind. In early infancy he was apparently much as other children, but in extreme youth he developed a wonderful precocity, or rather a supernatural endowment for mathematics, even then solving difficult problems with apparent ease and with but little study. This became a mania with him, and grew as he grew, to the exclusion of all other branches or thought, until finally, without knowing a single figure or letter of the alphabet, he became the perfect master of the science of mathematics. He has been tested by the most scientific men of this profession, and the answers to the most difficult problems that they have been able to propound are at his fingers' end, the invariably correct solution being given in an instant, quicker than thought.

As an instance of his remarkable powers, he has been known to keep more than a dozen clerks busy in taking invoice of a stock of goods. Indeed, his knowledge and application of the science of mathematics far exceed anything that the most scientific men are able to comprehend. Another phenomenal characteristic of this man is that he can tell the time to a second, either day or night. Awakened from the soundest sleep he can tell you, without hesitation, precisely what time it is. What Blind Tom is to music, Reube Fields is to mathematics; and, like that illustrious idiot, this one branch absorbs his entire mental capacity.

Another peculiarity of Fields is his utter fearlessness of snakes. In his childhood he manifested a fondness for these reptiles and made them his playthings, and, strange to say, he was never bitten, though he handled with great carelessness and freedom the most poisonous species. He is very superstitious, and believes his extraordinary powers direct gifts from his Creator, and says that were he to reveal the secrets, or use them for the purpose of gaining more than the necessities of life, he would expect to be deprived of them immediately. He has more than once refused offers of handsome salaries. His parents died sometime ago, since which time Fields has been roving around among his kindred, staying with each a greater or less length of time, according to the nearness of kinship.

He is very fond of playing checkers, and it is said that he has never yet met his match at this game. He is annoyed a great deal by people who are curious to see his extraordinary powers exhibited, and he says that this is his greatest trouble, for

whether he will or not, when a problem is presented the solution is bound to flash through his mind.

SAND DUNES.

The great sand dunes along the banks of many rivers, and particularly along the shores at the southern end of Lake Michigan, are due to the presence of the Ammophila Arenaria, or sand-gathering grass, which possesses a remarkable power of drawing up moisture. Indeed, it may almost be called a miniature water pump, for it is able to keep the earth wet for several inches around it. This wet earth catches and holds the drifting sand. The process goes on, the grass growing and the sand collecting, until a great sand dune is the result.

ORIGIN OF THE DIAMOND.

Perhaps it will be best to first state briefly two or three of the various theories which have been advanced:

1. Sir A. C. Ramsey, has urged that the real home of the diamond is in the schistose orgneissic rocks, of high antiquity, which are known to underlie the Kimberley shales, and which in other regions are even more directly associated with diamonds. From the broken and imperfect state in which the diamonds of South Africa are frequently found, it is certain that they cannot have been formed in the exact situation in which we now find them, while the fragments of gneiss which also occur in the mines prove that the diamond rock must have passed upward through the gneiss.

2, Professor H. G. Seeley, has suggested that carbonic acid found its way downward together with the water which (after its conversion into steam) has been shown to be the principal cause of volcanic eruptions. The carbonic acid was decomposed by heat, and then, under great pressure, the liberated atoms of carbon built up the crystalline form of that element known as the diamond.

3. Reasoning from the experiments of Mr. Hannay, it seems not impossible that the diamonds may have been derived from the carbonaceous matter contained in the shales through which the diamond rock passes. Not from those shales which form the walls of the present mines, but from shales occurring at a greater depth, and through which the intrusive bronzite has previously passed. If this be the case, it is clear that the supply of diamonds will cease when the shales have been worked through. In any case, the deepening of the mine will shed light upon the problem. Under the great pressure and high temperature to which the hydo-carbons in the shales would certainly be subjected at the time of the outbreak by which the existing pipes of volcanic rock near Kimberley were formed, the hydrogen of these hydro-carbons would be strongly attracted by the metal magnesium which now forms part of the bronzite. The carbon atoms—set free in this way—under the enormous pressure to which the whole mass would then be subjected, might aggregate together to form diamonds.

In any case, it is impossible not to agree with Professor N. S. Maskelyne when he says: "It is possible that carbon, like metallic arsenic, passes directly from the state of a solid into that of a vapour; and that the conditon for its sublimation in the form of crystals, or its cooling into the crystal diamond, is one involving a combination of high temperature, and high pressure present in the depths of the earth's crust, but very difficult to establish in a laboratory experiment."

Although, in the future, the geologist and the chemist must work together in the interesting task of discovering the mode of genesis of the diamond, yet it is clear that the onus of the direct proof must lie with the latter. In years to come, when the rocks of the diamontiferous regions shall have been mapped and studied as accurately and thoroughly as those of England have been, the geologist will probably be able to accurately locate the diamond in its true home—in the rock in which it was produced.

But as to the mode of its origin in that rock, the chemist will have much to say;

nor will the proof be considered complete until diamonds are produced artificially with certainty and ease. That they will be so produced the writer of this article considers certain, and if chemists had been able to command the expensive appliances necessary for the performance of the many and intricate preliminary experiments required —experiments which may involve years of failure—it is probable that success would have been attained ere now. When the Edison of chemistry arrives, artificial diamonds will be successfully made; they will perhaps, not be ornamental as those occurring naturally, but there is a wide field of usefulness awaiting such a product in the arts and manufactures.—Knowledge.

LAND BIRDS AT SEA.

The following story is credited by The New York Sun to a passenger on the steamship George W. Clyde from the West Indies:

"On last Monday evening the nearest land was the northeast end of the island of Abacoa, and this was 200 miles south-east by east. The Bermudas were 420 miles distant, and Turk's Island 440 miles. There was no wind at sea, and rain was falling heavily. Almost all of the passengers were assembled in the smoking room amidships. The room was small, and the door had been left open for ventilation. Suddenly a little bird fluttered in through the open door, darted against the lamp, and fell upon the floor. Another and another followed. Twittering was heard outside, and we found the decks covered with hundreds of winged creatures. They seemed to come from every side, attracted by the steamer's lights. In a few minutes, more than fifty had entered the smoking-room, and bedraggled little wretches they were. Their long flights had used them up. We could take them up like so many blocks. We put all that entered the smoking-room under some hats and left them for the night. Outside their comrades perched on the rigging and covered the decks. Great numbers of them were killed by flying against the stateroom windows. Their little bodies were scattered all about the ship. While we were attending to the birds in the smoking-room some larger birds that had perched on the rigging were caught by officers of the ship. Among them were two hawks, one of them of the smallest known variety, the Kestrel, and the other a common hen hawk. Hawks are generally shy, but so tired were these two that they allowed themselves to be captured. The big one, however, made savage fight, and drove his talons nearly through the palm of his captor's hand. We kept him for two days, but he would not eat, and finally he escaped."

"Besides the hawks, two water rails were caught, and some birds that resembled our catbird, but they were larger and had brown wings. They were probably a species of jay. The small birds were a little larger than a canary and of three varieties. One kind was yellow, and another brown, and the smallest and most numerous were gray, with very sharp beaks. In the morning we found a kingfisher perched in the rigging. He was rested, and we could not catch him. He would circle about the ship a few times when started, and then alight somewhere else on the ship. There was a little owl, too, that kept the kingfisher company, but he soon disappeared. We intended to keep some of the birds that were caged in the smoking-room, but when the boy entered to clean out in the morning he saw the hats there, and, gathering them up, to his surprise a flock of birds suddenly fluttered about him, and then flew out of the open door. They were very tame and perched all about the vessel. The officers of the watch said they could hear birds flying against the side lights of the ship and dropping into the sea all night. It is evident that there were thousands of birds flying that night. We treated our visitors as well as possible, and gave them plenty to eat, but they did not seem to appreciate our hospitality, and by noon almost all of them had left us.

"How to account for the appearance of these birds is a question. There were men on board who had traveled about the world for forty years and never had heard of such

a phenomenon, much less seen it. There was no wind. For two days before and after the birds appeared you could have pulled a shell in safety on the ocean. Our theory is this: Abacoa, one of the Bahamas, is celebrated for birds, You may know of its proximity by the birds that fly about the ship, Now, the birds that came on board on Monday evening were Bahama birds, and they are found all about the island of Abacoa. We concluded that there was a local whirlwind, or tornado, that took up all the land birds of a certain district, and that afterwards, by an upper current of air, they were swept out to sea. There was no surface wind, or we should have felt it. The storm could not have been general, for the effect of wind at sea is felt often in the swell of the ocean, when there is no apparent air current. We get the swells of storms hundreds of miles away, but on this occasion there was no swell. So the tempest must have been local. Now, as there was no surface breeze, there must have been an upper current that swept the birds along after they were taken up, for it's a physical impossibility for many of the birds we found to fly 260 miles, the distance of the nearest land. I do not believe the small birds unaided could have done it. Any one who has hunted rail birds knows that that bird could not fly half the distance. The rail is a marsh bird. He loves to dabble in the mud along shore where the reeds and rank grasses offer cover. If he is hunted he takes to his legs and quickly hides himself. His wings are ill fitted for long flights, and he seldom rises. Now, two of these shore-loving rails ran against us 260 miles from land. Mother Carey's chickens are often found in mid-ocean, but they are peculiarly a water fowl. The birds we saw were all land birds—never found so far at sea, unless by accident. This theory is strengthened by the diversity in the birds. There were nine species; three varieties of small birds, two of hawks, an owl, a kingfisher, a sort of jay and the rails. You couldn't find a more heterogeneous lot.

"It seems plain that some force collected them and drove them to sea. We kept some of them in the boats until off the coasts, and then liberated them. There were two rails—a male and female. The male escaped a day out from New York, and the female was the bird that made off for Staten Island when we were in the Narrows. I do not believe that any of the small birds that left us in mid-ocean got to land. They had a night's rest, it is true, but they were desperately tired for all that, and had no wind to help them back."

THE AXOLOTI.

The transformations in case of the amphibia from the larval to the very different adult form have furnished common and interesting cases of metamorphosis, which all have witnessed. Perhaps the most curious representative of this group of animals is the axoloti, which inhabits the high plateaus of the Rocky Mountain region, from Montana to Mexico. The animal is ten or twelve inches long, fish like in form, but with four legs, a long tail like that of a salamander, and a tuft of gills on each side of the large, flatish head. Specimens were taken to Europe many years ago. At the Jardin des Plantes one of these animals left the water of the aquarium in which it was kept. It had lost its gills, but they were replaced by lungs. An experiment was then made on specimens kept by Freulin Marie von Chauvin. She removed them from the water, kept them in damp moss, and thus actually forced them to transform into the gilless, air-breathing state. They then somewhat resemble the large yellow spotted salamander (Amblystoma) so common in this region. Previously it was supposed that the larval, or gill-bearing stage was the permanent one, especially since in it they breed—lay eggs which hatch into similar forms, as is the case in permanently gill-bearing species. The adult is not so large as the larval form giving us as Packard has said, an epitome of what has happened in the life of this and other classes of animals. For the fossil forms were monsters, yet larval and premature as compared with their descendants. Extended experiments have been more recently made upon these ani-

mals by the same lady. She found that younger specimens could be more easily forced to transform than older specimens. If the water in which they are kept contains but little oxygen, so that they must come frequently to the surface for air, they transform more readily than if the water is thoroughly ærated. Freulien von Chauvin then tried the experiment of converting the axoloti back from the higher stage to the lower. In this she succeeded, or at least a vigorous larval animal fifteen months old, after being transformed to the adult stage (which required twelve days), and being kept out of water for another fifteen months, was brought back again to the water, to which element it accommodated itself in the course of six days. Here it lived three and one-half months. Then it was again forced to live on land, which it did six months—till the time of its death.

Some animals were kept in a state of suspended metamorphosis for three years; that is, when partially transformed, further change was prevented by low temperature and being placed at night in the water. Then some of these partially transformed specimens were forced to return to the larval stage (axoloti), and the others to the higher stage (amblystoma). It was believed for a long while that the axoloti in its native regions never transformed to the amblystoma stage; but it has been proved that, while many do not, certainly others do. The latest observations were published in Science last July. Dr. Shufeldt, located in the northwest part of New Mexico, has kept the animals in aquaria, studying their habits and propensities. He has also had opportunity to watch them wholly undisturbed in their native ponds. He corroborates the several statements made by Freulien von Chauvin. He finds also that they are very voracious animals, and that if fed abundantly with meat, the amblystoma, or adult animal, is much larger. The deeper the water in which they are placed, the less likely they are to transform; but in shallow ponds that have little or no vegetation, where the bottom is formed of hard clay, the larval form is longer retained, and the color of the animal, though usually quite dark, becomes, in this case, very light. During the past summer, Dr. Shufeldt saw the pond, where were multitudes of these animals, rapidly dry up. Those caught by the disappearance of the water in their quarter, disappeared in the mud, and, just beneath the surface, very quickly transformed to the lung-bearing stage, and left for adjacent woods. Others in deeper water remained undisturbed. If a rain came suddenly, refilling the dried pond, the further change of the half-transformed axolotis at once ceased, and they continued to live in the water as before. But subsequent drying would compel them to take on the adult, or amblystoma stage.—Prof. Kellerman, in Industrialist.

THE CARBONIFEROUS AGE.

An editorial in the Mining Review of Sept. 17, 1885, under the heading of "The Foundation," states that, "if our store of coal was all 'created' and laid away for future use there is no special advantage to be gained in endeavoring to ascertain the laws and causes most active in its formation."

It seems to me, as a representative of large tracts of mountain lands, that there are great advantages to be gained in ascertaining even the probable laws and causes most active in the formation of coal; and that it is of vital importance to know in what formations to look, and where to spend money for exploring, with a reasonable prospect of success; and in this connection it becomes a matter of practical interest, in dollars and cents, not only to the land owners, but to the whole community, to know at what period in the formation of the earth's crust the carboniferous age commenced.

According to the theory of the most popular geologist of the Nineteenth century, the carboniferous age did not commence until after the deposit of the sedimentary formation called the seral conglomerate of the Pottsville coal basin; being Formation No. XII of the Pennsylvania nomenclature, the carboniferous age being all included in Formation No. XIII, and they pronounce any

man who looks for coal below that formation an imbecile, or worse.

Under this theory, the greater portion of the land in the world is laid under the ban of modern geologists.

Limestone, as well as coal, is classed by these same geologists as of organic origin, for the reason that some of these formations contain fossils, indicating animal and vegetable life; they assure us that the limestone Formation No II which, in some portions of the State of Pennsylvania, is said to be 6,600 feet thick, was deposited in the bottom of the ocean by the same animals which form the coral reefs along the coast; and yet we find this limestone underlaid by the sedimentary Formation No. I, called the Pottsdam sandstone, which is practically conglomerate rock.

We are assured by chemists that carbonate of lime contains about twelve per cent. of pure carbon, so that we should have nearly eight hundred feet in depth of pure carbon locked up in this Pennsylvania deposit of limestone Formation No. III. Admitting that it was formed of shell (which I do not), where did the shells obtain this vast quantity of carbon, if not from the ocean? And if from the ocean, it must have been in solution in the water as carbonic acid. If the carbonic acid and calcium, which form the carbonate of lime, were in solution i n the ocean, what was there to prevent their chemical combination in the water to form the limestone by direct action, and thus save the poor little coral makers millions of ages of toil?

Now let us suppose that there was a surplus of carbonic acid in the water after satisfying the cravings of the calcium and the formation of the vast beds of limestone. What next?

We find in the crust of the earth vast quantities of silica, and silicates of alumina. Now if these metallic bases, silicon and aluminium, were in solution in the acidulated water, they would readily combine with the oxygen of the carbonic acid, and come down as fire clay, and shales, to form a bed for the precipitate of carbon to fall upon, bringing down with it quantities of hydrocarbons to form the volatile portions of the coal.

If the water was badly agitated, this carbon would come down as a mixture with the mud, to form the slates above the limestone; but if in an inland sea where the waters were quiet, it would form layers of coal and shales.

The carbon to form the carbonic acid in the ocean, in all probability came from the interior of the earth, and was converted into carbonic acid gas by the same action and forces that cause earthquakes and volcanoes, and was injected into the ocean through the fissures below, under equal pressure. If this theory has the semblance of probability it is not unwise to look for coal in any portion of the earth's crust when the formations indicate the true coal series of conglomerate rock, limestone, fireclay, coal, shales; and the repitition of sandrocks, clays, coal and shales; so that an intelligent study of "the laws and causes most active in the formation of coal," is of no little value to the entire population of the world commercially.—Titus P. Emery, in Mining Review.

SCIENCE LEADS TO ECONOMY OF TIME AND LABOR.

How exultant is the old Greek poet Antipater ("Analecta Veterum Græcorum," Epig. 39, vol. ii., p. 119) when women are relieved of the drudgery of turning the grindstones for the daily supply of corn! "Women, you who have hitherto had to grind corn, let your arms rest for the future. It is no longer for you that the birds announce by their songs the dawn of the morning. Ceres has ordered the water nymphs to move the heavy millstones and perform your labor." Penelope had twelve slaves to grind corn for her small household. During the most prosperous time of Athens it was estimated that there were twenty slaves to each free citizen. Slaves are mere machines, and machines neither invent nor discover. The bondmen of the Jews, the helots of Sparta, the captive slaves of Rome, the serfs of Europe, and uneducated laborers of the present day, who are the slaves

of ignorance, have added nothing to human progress. But as natural forces substitute and become cheaper than slave labor, liberty follows advancing civilization. Machines require educated superintendence. One shoe factory in Boston by its machines does the work of 30,000 shoemakers in Paris, who have still to go through the weary drudgery of mechanical labor. The steam power of the world, during the last twenty years, has risen from 11¼ million to 29 million horse power, or 152 per cent.

Let me take a single example of how even a petty manufacture improved by the teachings of science affects the comforts and enlarges the resources of mankind. When I was a boy, the only way of obtaining a light was by the tinder box, with its quadruple materials, flint and steel, burnt rags or tinder, and a sulphur match. If everything went well, if the box could be found and the air was dry, a light could be obtained in two minutes, but very often the time occupied was much longer, and the process became a great trial to the serenity of temper, The consequence of this was that a fire or a burning lamp was kept alight through the day. Old Gerard, in his Herbal, tells us how certain fungi were used to carry fire from one part of the country to the other. The tinder box long held its position as a great discovery in the arts. The pyxidicula igniaria of the Romans appears to have been much the same implement, though a little ruder than the flint and steel which Philip the Good put into the collar of the Golden Fleece in 1429 as the representation of high knowledge in the progress of the arts. It continued to pre vail till 1833, when phosphorus matches were introduced, though I have been amused to find that there are a few venerable ancients in London who still stick to the tinder box, and for whom a few shops keep a small supply. Phosphorus was no new discovery, for it had been obtained by an Arabian called Bechel in the eighth century. However, it was forgotten, and was rediscovered by Brandt, who made it out of very stinking materials in 1669.

Other discoveries had, however, to be made before it could be used for lucifer matches. The science of combustion was only developed on the discovery of oxygen a century later. Time had to elapse before chemical analysis showed the kind of bodies which could be added to phosphorus so as to make it ignite readily. So it was not till 1833 that matches became a partial success. Intolerably bad they then were, dangerously inflammable, horribly poisonous to the makers, and injurious to the lungs of the consumers. It required another discovery by Schrotter, in 1845, to change poisonous waxy into innocuous red-brick phosphorus, in order that these defects might be remedied, and to give us the safety match of the present day.

What have these successive discoveries in science done for the nation, in this single manufacture, by an economy of time? If before 1833 we had made the same demands for light that we now do, when we daily consume eight matches per head of the population, the tinder box could have supplied the demand, under the most favorable conditions, by an expenditure of one-quarter of an hour. The lucifer match supplies a light in 15 seconds on each occasion, or in 2 minutes for the whole day. Putting these differences into a year, the venerable ancient who still sticks to his tinder box would require to spend 90 hours yearly in the production of light, while the user of lucifer matches spends 12 hours; so that the latter has an economy of 70 hours yearly, or about 10 working days. Measured by cost of production at 1s. 6d. daily, the economy of time represented in money to our population is £26,000,000 annually. This is a curious instance of the manner in which science leads to economy of time and wealth even in a small manufacture.

In larger industries the economy of time and labor produced by the application of scientific discoveries is beyond all measurement. Thus the discovery of latent heat by Black led to the inventions of Watt, while that of the mechanical equivalent of heat by Joule has been the basis of the progressive improvements in the steam engine, which enable power to be obtained by a

consumption of fuel less than one-fourth the amount used twenty years ago. It may be that the engines of Watt and Stephenson will yield in their turn to more economical motors; still they have already expanded the wealth, resources, and even the territories of England more than all the battles fought by her soldiers or all the treaties negotiated by her diplomatists. The coal which has hitherto been the chief source of power probably represents the product of five or six million years during which the sun shone upon the plants of the carboniferous period, and stored up its energy in this convenient form. But we are using this conserved force wastefully and prodigally; for, although horse power in steam engines has so largely increased since 1864, two men only now produce what three men did at that date. It is only three hundred years since we became a manufacturing country. According to Professor Dewar, in less than two hundred years more the coal of this country will be wholly exhausted, and in half that time will be difficult to procure. Our not very distant descendants will have to face the problem —What will be the condition of England without coal? The answer to that question depends upon the intellectual development of the nation at that time. The value of the intellectual factor of production is continually increasing, while the values of raw material and fuel are lessening factors. It may be that when the dreaded time of exhausted fuel has arrived, its importation from other coal fields, such as those of New South Wales, will be so easy and cheap that the increased technical education of our opperatives may largely overbalance the disadvantages of increased cost in fuel. But this supposes that future governments in England will have more enlightened views as to the value of science than past governments have possessed.

Industrial applications are but the overflowing of science welling over from the fullness of its measure. Few would ask now, as was constantly done a few years ago. "What is the use of an abstract discovery in science?" Faraday once answered this question by another, "What is the use of a baby?" Yet round that baby center all the hopes and sentiments of his parents, and even the interests of the State, which interferes in its upbringing so as to insure its being a capable citizen. The processes of mind which produce a discovery or an invention are rarely associated in the same person, for while the discoverer seeks to explain causes and the relations of phenomena, the inventor aims at producing new effects, or at least of obtaining them in a novel and efficient way. In this the inventor may sometimes succeed without much knowledge of science, though his labors are infinitely more productive when he understands the causes of the effects which he desires to produce.—Sir Lyon Playfair's Aberdeen Address.

MISCELLANY.

THE GORTYNA TABLES.

The learned world was startled last Summer, by the discovery of a great inscription at Hagioi Deka, the site of the ancient Gortyna, in Crete. The inscription was in boustrophedon, using the eighteen so-called Cadmean letters, and presenting so many orthographic and dialectic peculiarities that its difficulties prevented its appearing in the popular periodicals. The inscription was discovered by Dr. Frederico Halbherr, in July, 1884, in the bed of a mill stream. Dr. Ernest Fabricius succeeded in unearthing the whole inscription by the end of October, 1884, and found it to be on the inside of the enclosing wall of a presumably circular building, whose inner diameter was about thirty-three meters, the wall being about nine meters long, and about the height of a man. The inscribed wall consists of four courses of squared stones, of

limestone. Dr. Halbherr subsequently found another loose fragment in the stream. The inscription, in its present state, consists of twelve columns, more or less perfect, and between fifty and sixty lines to the column. Other pieces turn out to have been previously found by other persons. The date of the inscription appears to be the fifth century before Christ. It was immediately seen that this inscription was a section of the famous Cretan laws; in all probability some of those which give more than heroic fame to Minos and Rhadamanthus. It was not possible to obtain sqeezes; but Halbherr and Fabricius made careful copies, and attempts at decipherment immediately followed. The chief, and apparently the first works on the subject, were the following: Dareste, "La Loi de Gortyne," in Bulletin de Correspondence Hellenique, 1885, pp. 301—317; Heinrich Lewy. "Aites Stadtreeht von Gortyn auf Kreta." Berlin, 1885, Franz Bucheler und Ernst Zitelmann, "Das Reeht von Gortyn," Khetnisches Museum Erganzungsheft XL; Domenico Comparetti. Leggi antiche della gita gi Gortina in Creta," Florence, 1885. Prof. A. S. Merriam also read a paper on the subject at the meeting of the American Philological Association in New Haven, last July. But the most self-commending publication thus far, is the very recent one of Johannes and Theodor Baunack, entitled "Die Inschrif von Gortyn," published by S. Hirzal, of Leipzig; an 8vo volume of 167 pages, with a fac simile plate. The decipherment, or rather, the solution of the orthographical, dialectric, and lexical puzzles, appears to be so far advanced that the inscription may be said to be read, and the laws to be fairly understood. The work of the Baunacks treats first of the alphabet, then gives the inscription in ordinary type, with the numberings of the original in capitals, with transcriber's variants in the lower margin. Then follows the grammatical matter deduced from the inscription, occupying the largest portion of the work; then the inscription divided into words accented and punctuated, with a translation in German, occupying 24 pages. then the lexical and exegetical matter, and a complete word-index. The contributions of the inscription to Greek lexicography and palæography are very great, and cannot be overvalued; but the matter of the law is of general interest, although they deal with many matters which Christianity has rendered well-nigh obsolete among civilized nations. The first section treats of lawsuits for the possession of an alleged slave. The alleged slave is not to be spirited away till the cause is decided, under a penalty to be paid by the litigant so doing. The law provides, in brief sentences, for the case when the alleged slave is proved to be free, when he is proved a slave and his posession is due to either litigant, and so on; and also for the various contingencies that may occur during trial. The second section provides for seduction, adultery, and the like; the third for division of the property in case of separation of man and wife, or the death of one of them; the fourth for the custody of children of separated wives or concubines; the fifth, provisions respecting the property of parents during life, and its disposition after their death; the sixth, of the limits of control over the property of members of the same family; the seventh, of certain peculiar cases in the law respecting slaves and children; the eighth, concerning the rights and duties of heiresses; the ninth, concerning sundry cases of suretyships; the tenth, concerning presents; the eleventh, of adoption, and its concomitants; the twelfth, supplementary matter to the preceeding. The provisions that relate to slaves, as might be supposed, breathe the spirit of all antiquity, which recognized nothing at all in the slave except the property of the master. With respect to separations of man and wife, since those are part of the institutions of almost all humanity outside of Christendom, there are a few lessons which might be taken to heart by those legislators who favor easy divorce. Thus:

"When man and wife are separated, she shall have, as her own property, that which she brought to her husband, and half of the increase, if any such has come from her own estate, and half of all that she has

gained in the house [of her husband]; and five staters if the husband is to blame for the separation. But if the man alleges that he is not to blame for the separation, the judge shall decide between them, upon oath."

So again:

"If a separated woman comes back, the child shall be brought to his house in the presence of three witnesses. If he does not receive it, then the mother shall have power over the child, to rear it or to expose it; but the relatives shall first have a right to her oath and witnesses, whether she offered it [to her husband or not]."

In the case of a divorced female slave, who comes back with the child, the husband's master was to have the full decision; and that, also, even if she had re-married the same man within a year. If a separated wife should expose a child before complying with the foregoing provisions, then she had to pay a fine of fifty staters if the child were free, but twenty-five if a slave. In general, the laws show the spirit of equity, as nearly as we can perceive from our present knowledge of Cretan society. To-day, of course, we are scarcely able to see the justice of compelling an heiress to marry her oldest male cousin, or if he is not willing, or if he is not grown up and she will not wait, lose a large portion of her heritage. However, an heiress was one who had no father or brother. She might also, in case the cousin would not or could not marry her for other reasons, marry whom she would and retain her whole inheritance. Adoptions might be made at pleasure, but it must be publicly done in the agora, before the assembly of citizens at the usual place of proclamation; but the one adopting a son had to give his "Hetaireia" material for a sacred offering, and a jar of wine. If an adopted son is the only child surviving the one who adopted him, he becomes full heir only on condition of performing all the religious and legal duties to his adoptive parent; but if he in turn died without leaving children, the property reverted to the relatives of the adoptive parent. The latter might, also, at any time, publicly annul the adoption by a proper proclamation and paying a fixed number of staters. An English translation of these laws, or better, an edition of the inscription edited and translated in English, is a work now much to be desired.—Exchange.

A SLAVE TO THE STARS.

An attempt is made to break the very eccentric will of Robert Treat Paine, a wealthy Bostonian who died last June. Mr. Paine was always regarded as a sort of crank during his life. For example, he paid over $1,000 in fines for stubbornly persisting in not clearing the snow off his sidewalk.

Regarding astronomical matters he was always thought to be half insane. When he died it was found by the terms of his will $50,000 was bequeathed to the president and fellows of Harvard college, or more if they deemed it necessary for the maintenance and support of a professorship at Harvard, to be called the professorship of practical astronomy, the holder of the same to be the director of the astronomical department. In commemoration of the great-grandfather, grandfather and father or the deceased, it is the wish of the testator that the professorship be called the Paine professorship.

All the residue of the property and estate is bequeathed to the president and fellows of Harvard for the support of the observatory, for the discovery of new comets, and planets, and for the purchase of medals for prizes for valuable essays written on astronomy, provided that the president and fellows pay monthly out of the fund $250 to the widow, Ann W. Paine, upon her written order.

The will was approved, but several appeals have been filed objecting to the decree of the probate court in allowing the will. The widow files an appeal in which she claims that her husband was not of sound mind when he made the will; that the witnesses did not sign it in the presence of the testator, or of each other: that undue influence was brought to bear on the mind of the testator, and that the instrument as

made was afterward revoked. Elizabeth P. Patch and Charles W. and Henry M. Claggett, all of Boston, heirs at law of the deceased, have also taken appeals to the allowing of the will upon the ground that they are interested in the estate. The case when heard will be one of great interest, and some remarkable testimony regarding Mr. Paine's eccentricities will be given.

VISIT TO A SHOT TOWER.

Shot is formed by pouring a melted piece of alloy of lead through a colander or sieve at the top of a high tower. In falling to the base of the tower the particles of semi-fluid lead assume the globular form. They fall into a vessel of water placed to receive them, before reaching which they become so nearly solid that their globular form is retained when they strike the surface of the yielding element. An arsenical preparation forms the alloy, which makes the lead more ductile, softer and better fitted to take the spherical form. The soft and pure American lead requires less arsenic than the hard and brittle foreign varieties. Too much arsenic causes the drops to assume the lenticular form, and too little, causes them to elongate, to flatten on one side and hollow in the middle as they cool. The higher the tower the larger the shot that may be dropped in it. I had an opportunity at Chicago of inspecting the whole process of making shot. Also at the same time I saw how sheet lead and lead pipes are manufactured, and the no less interesting processes in the manufacture of linseed oil.

The lofty tower, as high and almost as massive as Bunker Hill monument, must have attracted the attention of nearly every one who has visited the city. From its summit the best view of the city is to be obtained. It is one of the tallest towers erected for this purpose in the world. There is one in Europe two hundred and forty feet high. Some of the perpendicular bluffs on the upper Mississippi, in the vicinity of the lead mines of Iowa and Wisconsin, are used in the place of towers, the melted lead being dropped over the precipices.

The shot are of larger dimensions than the holes of the colander through which they pass. Mr. Blatchford dipped out a handful from the cistern for our inspection. There were quite a variety of sizes, and many of the drops had assumed irregular forms. The first done with the shot is to dry them, and then the perfectly spherical ones are selected by a very ingenious contrivance, as simple as it is ingenious. A series of inclined planes is so arranged, one below another, with gaps between, that when the shot is poured upon the top one, the perfectly spherical ones of all sizes, bound forward merrily in straight lines, skipping the gaps unerringly, and flying off neither to the right hand nor left. Anyone who has tried to roll an imperfect ball in a tenpin alley, knows what an irresistible attraction the sides of the alley have for that poor ball. It will not keep upon the straight highway cast up for it, but must needs roll into the ditch, a melancholy instance of the "depravity of inanimate things." So the imperfect shot scatter out at the sides of these planes. And even if they chance, by a miracle of grace, to keep in the center, they drop into the cunning pitfalls over which their perfect brethren nimbly skip in safety. The nearly perfect ones sometimes escape several of these gaps, but are all caught before they reach the bottom, and, self-convicted, are unceremoniously returned to the melting pot. The perfect ones of all sizes run into a revolving barrel, where with a little pulverized graphite, or plumbago, they roll about for a while, and acquire the brilliant polish which is their finishing touch.

It only needs now to assort the sizes and to pack them in the little canvas bags familiar to all sportsmen. They are sorted in revolving cylinders slightly inclined, perforated with holes, which increase in size toward the lower end. Each size drops out as soon as it comes to a set of holes large enough to allow the shot to pass. The arrangement for weighing and bagging them is very ingenious. Receptacles numbered from one to twelve, according to the size of the shot, under the revolving cylinders,

conduct the little death-dealing missiles through tunnels into the canvas bags. As soon as a bag has received its twenty-five pounds its weight shuts a valve, and no more can come till the bag is removed, and another one put into its place. One man tends the whole row, with needle and thread sewing up the bags, which are then ready for the market. All the work of the tower, except that which is done by machinery, is performed by three men.—Exchange.

SOME OLDEN TIME PECULIARITIES OF MEN'S DRESS.

There is no part of mens' costume which has not passed from one extreme of absurdity to another, and been most admired at its highest point. Coats have been worn with voluminous skirts dangling about the wearer's heels and with scanty lappels descending six inches below the waist. Coat-sleeves at one time fitted skin tight, and more than once have been so wide as to sweep the ground.

Flapped waistcoats, which in the time of George I, reached nearly to the stocking, were soon cut so short as to be nearer the armpits than the thigh. The tight fitting, closely-strapped trouser contrasts ludicrously enough with the trunk hose of the sixteenth century stuck out with five or six pounds of bran.

It is related that a fast man of that time on rising to conclude a visit of ceremony had the misfortune to damage his nether integuments by a protruding nail in his chair, so that by the time he gained the door the escape of bran was so rapid as to cause a collapse. It may have been that similar mishaps caused the substitution of wool or hair for bran, which afterwards became common.

Holmes, in his "Notes on Dress," says: "A law was made against such as did stuff their 'bryches' to make them stand out; whereas, when a certain prisoner (in these tymes) was accused for wearing such bryches contrary to law, he began to excuse himself of the offense, and endeavored by little and little to discharge himself of that which he did wear within them. He drew out a pair of sheets, two table-cloths, ten knapkins, four nightcaps and other things of use, saying, 'Your Lordship may understand that because I have no safer storehouse, these pockets do serve me for a roome to lay my goods in, and though it be a strait prison, yet it is a storehouse, big enough for them, for I have many things more, yet, of great value within them.' And so his discharge was accepted and well laughed at."

CURRENT LITERATURE.

Political Economy.

PRACTICAL ECONOMIES: A COLLECTION OF ESSAYS RESPECTING CERTAIN OF THE RECENT ECONOMIC EXPERIENCES OF THE UNITED STATES. By David A. Wells, LL. D., D. C. L., etc. New York and London: G. P. Putnam's Sons, The Knickerbocker Press, 1885.

This book is a compilation of papers from the pen of the distinguished author, which have appeared, from time to time, in various periodicals and newspapers. It would be supererogatory to enter into a discussion of Mr. Wells' ability and learning in respect to the subject matter of these papers, for he has long been an oracle to free-traders, monometalists and conservative economists. In fact his celebrity has been chiefly obtained as a publicist, and it would be impossible for any one to gain such a prestige without manifesting great merit and ability in his performances.

The papers comprised in the volume all touch on living questions in finance, commerce and social statics. And, while these subjects are discussed in a partizan spirit, and the errors of opposing schools exposed with great vigor, still the skill of the writer, his keen and trenchant logic and ready wit, keeps the reader interested in spite of antagonistic views.

Mr. Wells writes with the candor of conviction. No one can read the above volume without believing that his opinions, however erroneous or

specious, are honest ones, and founded on experience in affairs and thorough acquaintance with the past and the present of the world's history. Those who wish to see both sides of the shield (and have only seen the silver side) should turn to Mr. Wells' book for aid.

Natural History.

THE STANDARD NATURAL HISTORY. Edited by John Sterling Kingley. Vol. V., Mammals. Illustrated. Boston: S. E. Cassino and Company, 1884. Kansas City: C. E. Hudson & Co.

This is Volume V. of a work of which Volumes I. and II. were noticed some time ago in the REVIEW. The intervening volumes (III. and IV.) have been delayed, we are told, by the binder, but will be forthcoming before Christmas.

The present volume comprises an account of the Mammalian family, and embodies the work of such specialists as Dr. Cones, Dr. Theo. Gill, J. S. Kingsley, W. N. Lockington, Samuel Lockwood, George Macloskie, Wm. B. Scott and R. R. Wright. It begins with a very useful and lucid introduction, which serves as a key by which the merest tyro can read what follows with pleasure and profit. The illustrations are new and excellent, being faithful representations of animal life. The "Standard Natural History" is destined to be the leading popular work on the subject of animated nature; and if the opinions of eminent scientists carry any weight, it is equally as useful to the student as to the general reader.

It is especially valuable to the young. Children and youths will read such a work with the avidity they would a novel, and the benefit they would derive from it cannot be compared to that derived from any other class of literature.

History.

HISTORY OF THE PACIFIC STATES OF NORTH AMERICA. By Hubert Howe Bancroft. Vol. XV., California. Vol. III., 1825–1840. San Francisco: A. L. Bancroft and Company, 1885.

Mr. H. H. Bancroft is performing a service for the Pacific coast unprecedented in former literary adventure. If the Atlantic States and the Mississippi Valley could have had their annals written in the full and generous method Mr. Bancroft has adopted, the results would have justified even the lavish expenditure and labor bestowed on the Pacific States History. It is true we have had a Schoolcraft, a Gallatin, a Parkman, an Irving, a George Bancroft, and many other eminent ethnological and historical writers: but their labors have not all been directed toward definite ends, and they have been too much hampered by the supposed necessity for balanced sentences and cadenced words. To tell the truth an artificial literary style is least needed in historical writings; for it always seems to be leading the attention from the facts and events narrated, to the ostentatious author.

The volume before us tells in good terse English, the story of an epoch as romantic and adventurous as any in history. In the two preceding volumes of Californian chronicles, the narrative of discovery and colonization has been brought down to 1825. Then commenced the stirring for independence which was to bring about civil war (not very sanguinary, however), between northern and southern California. The story of the skirmishes, the bickering, the diplomacy and intrigue characteristic of the time is well told. This history has one source of great interest to old Californians. In each volume there is carried along an alphabetical pioneer register—giving a short biography of the immigrants who arrived in California from 1542 to 1848. This must have required an immense amount of labor in its compilation. No one can be said to be familiar with Californian history who has failed to read Bancroft's volumes.

Reference Books.

INDEXES TO THE ENCYCLOPÆDIA BRITANNICA, Ninth Edition. American Reprint. Philadelphia: J. M. Stoddart Co. Limited. 1884.

Those who have had occasion to consult the Encyclopædia Britannica can appreciate the value of an index which will direct him to the matter, and the matter alone, he wishes to refer to. While this great work stands unrivalled in its special field, there has always been a serious difficulty in the way of its popular use. In other similar works the arrangement of matter is more after the manner of a lexicon, and cross-references help the seeker after knowledge on his way; but in the Britannica, matter that might be distributed under fifty heads is put in under Astronomy, Botany, Geology, Mathematics, Palæontology or some such captions to the dismay of the hurried and the despair of the lazy. This Index furnishes just what is needed to overcome these difficulties. Upon an examination we find it thoroughly reliable and extremely useful.

Poetry.

UTOPIAN DREAMS AND LOTUS LEAVES. By George W. Warder. London: Sampson Low, Marston, Searle & Rivington. 1885.

It is the special mission of the REVIEW to encourage the growth of Literature in the West, and therefore it is with great pleasure it calls attention to the sheaf of poetry entitled above.

Mr. Warder has been so long considered the Bard of Kansas City, that we should feel quite startled to read Another's lyrical characterization of local or visiting celebrities,

In the volume before us there is quite a wide range of subjects to choose from; and it seems improbable that there could be any one entirely unsuited. He flies from "grave to gay from lively to severe," with the rapidity of thought and, like Puck, puts a girdle round the earth in "forty minutes," or thereabouts. So facile is our author, so unhampered by space, or time, or conventionalities, that he keeps his reader in a constant fever of anxiety as to his next flight. In this Mr. Warder can justly lay claim to great originality; for no one can deny that the introduction of a new principle into literary style is an achievement accomplished by but few, and when this principle is founded upon a characteristic of human nature so fleeting as the charm of uncertainty, it may easily be seen that genius, and genius alone, could have discovered and utilized it.

There it one fault we must find with Mr. Warder's poetry—it is a little fault and can easily be remedied. There is too much compresion, too much attention to the matter rather than the form. Mr. Warder is not a florid writer. Now and then, it is true, he forgets reserve, flings prudence to the winds, mounts the most skittish Pegasus that can be captured in all Castalia, and, riding amuck at the startled moon, scatters flowers, jewels, diadems, over the hushed universe. But these moments of poetic fervor are all too rare; his sober muse is rarely "Empress of the raging storm."

Without wishing to be hypercritical, there is one other fault to be found with our Bard. Occasionally he slyly indulges an ironical mood, which is most unexpected in the Minstrel of Eden Dell. It was Byron, I think, that contemned blank verse as "prose run mad." Mr. Warder has seen fit to adopt the same view, apparently, and in a humorous moment has travestied that form of poetry in a piece entitled "What Causes Poetry." This opens as follows:

"This causes poetry. 'Tis the first effort of the
Mind to soar into fair fields of glowing fancy;
To lift itself into high channels of bright thought;
To perceptions lofty and enthusiastic of the
Grand and beautiful, to struggle up to
Greater light, to something better and more
noble
Than the groveling and material things
That make the routine of each passing hour."

In the words of Mr. Pecksniff, "it was not well" in Mr. Warder to thus rudely travesty a form of verse so sublimely used by Milton, so exquisitely refined by Tennyson.

The frontispiece does scant justice to Mr. Warder's face. We assure the stranger fair ones who read his book (and we hope they will be legion) that he is a much handsomer man than the graver makes him to be.

Other Publications.

NATURAL GAS; ITS ADVANTAGES, USE, SUPPLY AND ECONOMIES. By George H. Thurston. Pittsburgh: A. A. Anderson & Son, 1885; pp. 31.

BULLETTIN OF THE WASHBURN COLLEGE LABORATORY OF NATURAL HISTORY. Francis W. Cragin. Topeka: R. E. Martin & Co. 1885. Price 20 cents.

LE TAENSA A T' IL ETE FORGE DE TONTES PIECES? Response a M. Daniel G. Brinton, A. M., M. D. Par Lucien Adam. Paris: Maisoneuve Freres et Ch. LeClerc. 1885.

DOM PARISOT, NE PRODUIRA PAS LE MANUSCRIT TAENSA. Lettre a M. Victor Henry. Paris: Maisoneuve Freres et Ch. LeClerc. 1885.

LE TAENSA N'A PAS ETE FORGE DE TONTES PIECES. Lettre de M. Friedrich Mueller a Lucien Adam. Paris: Maisoneuve Freres et Ch. LeClerc. 1885.

THE COMPARATIVE LONGEVITY OF THE SEXES. Mrs. A. B. Blackwell. Read before the A. A. A. S. 1884.

THE CO-OPERATIVE INDEX TO PERIODICALS. Quarterly. W. I. Fletcher. Vol. I., No. 3. New York and London.

BULLETIN OF THE AMERICAN MUSEUM OF NATURAL HISTORY (Central Park, New York). Vol. I., No. 6. W. C. Martin. 1885.

ANNALS OF MATHEMATICS. Ormond Stone and William M. Thornton. Vol. I., No. 6. Charlottesville, Va.: Blakey & Prout. 1885.

ATTI DELLA SOCIETA TOSCANA DI SCIENZE NATURALI. Processi Verbali. Vol. IV. 1885.

FOURTEENTH REPORT OF THE STATE ENTOMOLOGIST OF THE NOXIOUS AND BENEFICIAL INSECTS OF THE STATE OF ILLINOIS. S. A. Forbes. Springfield, Ill.: H. W. Rokker. 1885.

Some Titles from the Magazines.

"The Negroes of the Congo." Blackwood's Magazine for October.

"A Polish Elias." The same.

"Competitive Examinations in China." The same.

"The Land Question." The same.

"What About Ireland." The same.

"Electric Tramcars." The Electrician and Electrical Engineer for November.

"The Proper Method of Obtaining the Average Duration of an Incandescent Lamp. The same.

"Dynamometers." The same.

"Carrying and Distributing Electrical Conductors through Cities. The same.

"Experiments with the Thermal Telephone." The same.

"Liability of Telegraph Companies as affected by Printed Conditions." The same.

"The Burman Dispute." Science for November 6.

"Æstivation of Mammals, What is it. The same.

"Quantitative Determination of Niobium." American Journal of Science for November.

"Notes on the Surface Geology of the Country bordering on the Northern Pacific Railroad." The same.

"Rainband Spectroscopy." The same.

"Displacement through Intrusion." The same.

"Spectrum of Nova Andromeda." The same.

"The Distribution of Light and Heat." Light, Heat and Power, for October.

"Hydrophobia." Kansas City Medical Index for October.

"Early Plastering and Plasterers." California Architect and Building News, for October.

"What is Life." Microcosm for November.

"Camping Tour to Yosemite Valley." The same.

"Time and Space." The same.

"Love of the Beautiful." The same.

"William Lloyd Garrison." The Dial for November.

"Localization of the Functions of the Brain." Phrenological Journal for November.

"The Influence of Inebriety on Civilization." The same.

"On Tidal Theory and Tidal Prediction." Journal of the Franklin Institute for November.

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